Montana Outdoors

Nov./Dec. 1982
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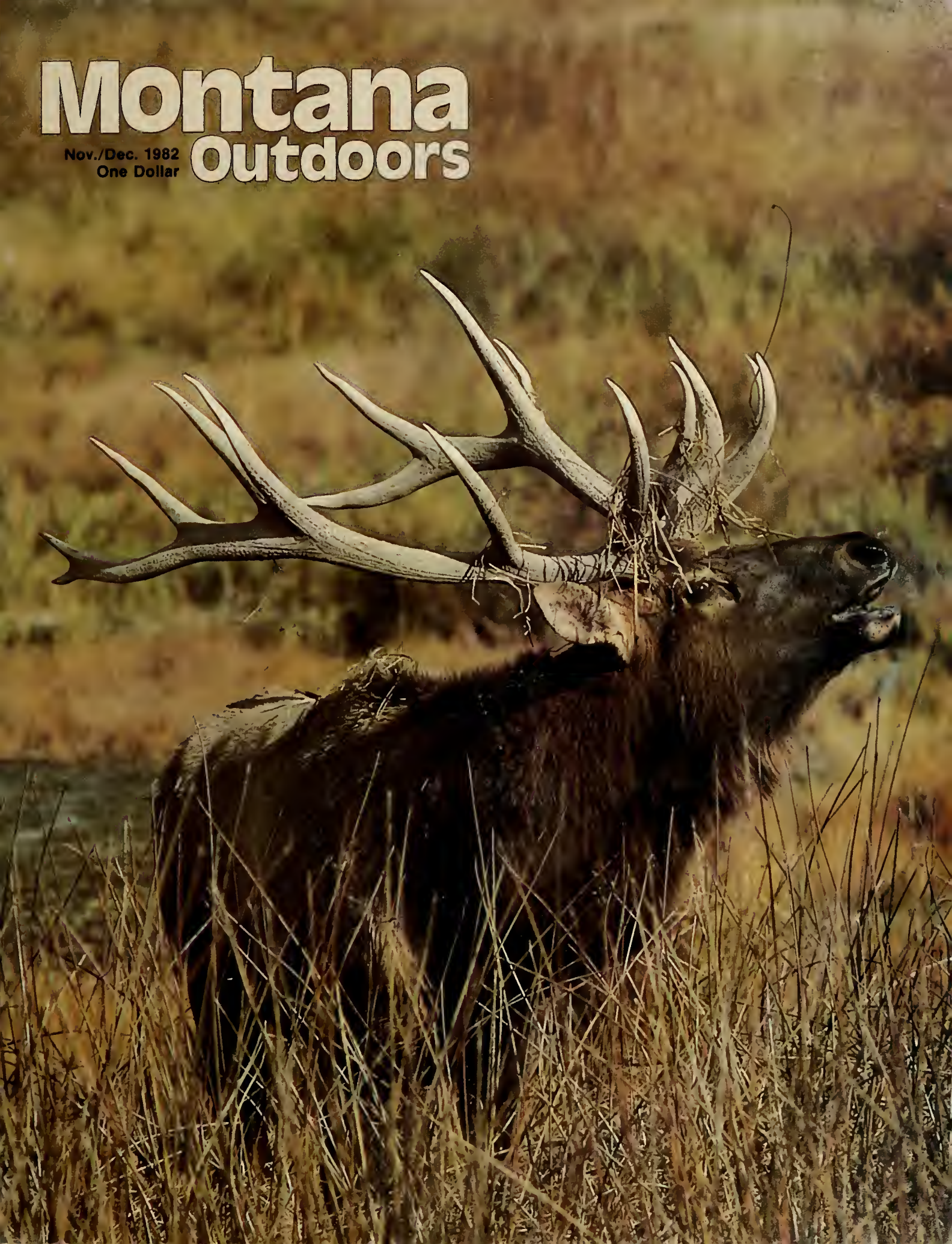

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Montana Outdoors

Nov./Dec. 1982, Vol. 13, No. 6
(USPS 360 280)

Front Cover
To many hunters, the eerie, rising whistle of a bull elk bugling is as much a part of autumn as the leaves turning. Bill McRae's photograph brings the elk, the sound of its bugling, and the feeling of the season into your living room.

Back Cover
Each fall, about the time western larch needles turn golden, bald eagles—such as the one in Gary Strobel's photograph—begin to arrive at McDonald Creek in Glacier National Park. The eagles stay as long as kokanee are available, usually through early December.

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McDonald Creek's Bald Eagles: An Internatio

by Riley McClelland

• *The hard work, dedication, and enthusiasm of several people made possible the research described in this article. Pat McClelland has been a research associate since the project began in 1965. Leonard Young recently completed a master's thesis (University of Montana) on movement of the eagles from McDonald Creek. John Crenshaw is still engaged in master's thesis research (University of Montana) on the project. David Shea was instrumental in studies accomplished in the 1970s. Harriet Allen and Elizabeth Spettigue worked as research associates in recent years, and Becky Williams provided assistance. Financial support came from many sources, notably: USDI National Park Service; Alberta Division of Fish and Game; Parks Canada, Department of Indian and Northern Affairs Canada; USDA McIntire-Stennis grant; University of Montana Forest Conservation and Experiment Station; Wildlife Management Institute; American Petroleum Institute; National Audubon Society, and USDI Fish and Wildlife Service.*—Ed.

Before the late 1930s, only an occasional bald eagle was noted flying over the McDonald Creek area in Glacier National Park. In striking contrast, on Nov. 5, 1981, 639 bald eagles were counted along the shores of Lake McDonald and the 2.5-mile length of lower McDonald Creek. Within the memories of a few long-time residents of the area, McDonald Creek has become the site of the largest concentration of bald eagles south of Alaska.

Eagles did not concentrate at McDonald Creek 50 years ago because there was no major food source. But kokanee salmon, which were never native to the Flathead River system, were introduced into Flathead Lake in 1916 and into Lake McDonald in 1922. The first spawning run in lower McDonald Creek was recorded in 1935. Annual runs now occur each autumn, with most of the salmon coming from Flathead Lake, 60 miles downstream. After kokanee spawn, they die. Some of their eggs are eaten by dippers and diving ducks, primarily goldeneyes, and other eggs mature into a new spawning generation four years later. The kokanee carcasses provide food for many wild animals—grizzly and black bears, coyotes, gulls, and even white-tailed deer and mallards are attracted by the dead salmon.

The evolution of the eagle concentration has been most rapid in the past two decades (Figure 1). Each autumn, the eagles begin to arrive in early October, when western larch needles are turning gold. The peak number of eagles occurs during

nal Resource

Adult bald eagles use their talons to grasp dead or weakly swimming salmon at the surface of the creek (far left photo: Riley McClelland). Eagles perch along McDonald Creek watching for salmon (middle photo: Riley McClelland). Great Slave Lake, 850 miles north of the United States border (in Canada's Northwest Territories), is the summer territory for many McDonald Creek eagles (above photo: Pat McClelland). They nest in trees near the shore, on the ground on islands, and in cliffs that rise above the water.

November, but the gathering is ephemeral; it lasts only as long as the kokanee are available, usually through early December. When all salmon have been eaten or have decayed, the eagles must move on in search of other food.

To protect eagles from disturbance, the lower McDonald Creek area is closed to human entry. But Apgar Bridge, the designated observation point, offers a good view of eagles feeding on salmon, perched in nearby trees, or soaring overhead.

When one watches the eagles, some questions inevitably come to mind: How have so many eagles found out about the salmon? How many salmon do they eat? Where do the eagles come from, and where do they go when they leave? What are the major threats to this endangered species? Answers are important in understanding the life history of the bald eagle and in increasing our ability to effectively manage the species.

To speculate about how eagles learned of the salmon food source in McDonald Creek, we must consider the historical pattern of bald eagle migration in this part of North America. In Canada, much of the bald eagles' summer food—primarily fish—is gradually locked away under ice, as autumn days grow short and cold. So, most eagles migrate south to areas where winter food is more readily available. Before European man began to change the face of the continent, bald eagles migrating south must have encountered an abundance of food. In the Columbia River system west and south of Glacier, natural salmon spawning runs attracted many eagles. Now, more than 50% of the spawning area originally available to salmon in the Columbia system has been lost as a result of dams. On the Great Plains, just east of Glacier, carrion from the vast herds of bison, elk, and other mammals must have provided great quantities of food for opportunists like bald eagles. As humans reduced the herds on the plains and dammed salmon rivers, winter food for eagles greatly diminished.

When the salmon introduced into Flathead Lake began to establish spawning runs in McDonald Creek in the late 1930s, a new source of abundant food became available. But how did the eagles discover it? If McDonald Creek had been on a consistently used autumn migration corridor, the concentration should have grown very rapidly after the spawning run became established. This did not happen (Figure 1).

With more than 1,000 eagles now passing through the McDonald Creek area each autumn, some mechanism other than chance must have been involved. The slow increase in numbers during the first two decades indicates that local eagles gradually discovered the salmon, but the major migration corridors for Canadian eagles at that time probably passed some distance from McDonald Creek—down the North Fork of the Flathead River and along the eastern slope of the Rocky Mountains. These are still primary migration routes, but many eagles now diverge to visit the McDonald Creek salmon run before continuing south. The key to the discovery of the McDonald Creek run may be related to two characteristics of bald eagles—their acute vision, and their tendency to soar in groups up to several thousand feet above an abundant food source.

Published studies indicate that the eye of a bald eagle may have resolving power three to eight times greater than a human's eye. We conducted a crude field test to estimate the distance at which one flying eagle might actually see another. We determined the distance at which we could see a small silhouette of an eagle, cut to scale, then calculated distance in relation to the size of a real eagle and the higher resolving power of an eagle's eye. Results indicated that one eagle might see another up to 40 miles away, under ideal conditions. Although such conditions may not occur commonly in nature, if a number of eagles were soaring together, the "spot" in the sky would be much larger, increasing the

possible visual contact distance. With such keen sight, it is conceivable that an eagle flying south along the east side of Glacier Park, in the vicinity of St. Mary, could see a group of eagles soaring over McDonald Creek, 32 miles away.

Only after the concentration included a number of birds which soared as a group were many other eagles attracted to McDonald Creek by sight. Nearly every windy afternoon during late autumn, groups of eagles soar over the creek. The oversimplified answer to "How did the eagles find out about the concentration?" may be "They saw other eagles there!"

The salmon run may have been found by other means too. Eagles without experience (especially juvenile eagles) may follow eagles that have been to McDonald Creek during previous autumns and are exhibiting "purposeful" flight, rather than wandering or searching flight. Or, information about known feeding areas may be transmitted at roosts, where a large number of eagles spend the night in a group. Once McDonald Creek has been visited in the autumn, an eagle probably returns during each subsequent autumn migration.

The maximum number of eagles counted has varied greatly, even in recent years. Weekly counts by researchers in canoes are not precise, but they have been conducted in a standardized manner since 1965 to provide week-to-week and year-to-year comparisons. The method prevents counting the same eagle twice; eagles beyond view from the creek are missed, so the totals are conservative. Annual variation in the number of eagles may be influenced by changes in the number of salmon available, length of time they are available, eagle productivity the preceding summer, or survival the preceding year.

At the peak, twice as many adults as subadults are counted. Adults have the characteristic white head and tail, which is not usually acquired until the eagle is at least 5 years old. Subadults have various combinations of brown and white mottling and resemble golden eagles (which are rare at the concentration). Adult bald eagles usually take floating salmon by diving on them and seizing them without entering the water. Young eagles, especially juveniles (only two or three months out of the nest when they reach McDonald Creek) have not yet developed such prey-capturing skills. Instead, they wade into the creek to take dead salmon. Because they often have a difficult time obtaining sufficient food, the death rate of first-year

Figure 1—Eagle concentrations at McDonald Creek, 1940-1981.

eagles may exceed 50%. The abundance and easy accessibility of the salmon at McDonald Creek may make possible the survival of many juvenile eagles that would otherwise starve during their first winter.

The maximum number of eagles counted during a season gives no indication of the length of time eagles spend at the site. Calculating eagle-use-days (EUDs) may be a more useful method of comparing total eagle activity from one year to another. For example, an eagle recorded on a weekly census may have been present for only that day (one EUD) or for the entire week (seven EUDs). By using the count totals of each consecutive pair of counts throughout the season and calculating the average number of eagles per day for these periods, total EUDs for the season can be derived. With this figure, one can then estimate how many salmon the eagles need to meet their energy requirements. Work done by Mark Stalmaster, a Utah State University biologist, indicated that a bald eagle needs the equivalent of about 1.1 pounds of salmon per day to meet minimum energy requirements. This amounts to about two kokanee per day, since the average weight per kokanee over a 17-year-period is about 0.6 pounds. More salmon per day are required if an eagle is to store energy reserves for migration.

In 1981, when the kokanee were much larger than average, there were 16,424 EUDs and a minimum of 17,409 salmon would have been needed. The maximum eagle count that year was 639. In 1978, the previous high count year (618), 26,035 EUDs were recorded. In that year, salmon were smaller, but they were abundant and available over a long period of time. If all eagles met their minimum requirements, 45,882 salmon would have been consumed. Although peak counts both years were not very different, the EUDs were more than 50% lower in 1981, reflecting a much shorter stay and probably a more limiting supply of salmon. In other words, even though the salmon were larger, this was not sufficient to offset the reduction in the length of the spawning period.

Where do the eagles come from and where do they go? Only a few bald eagles nest within Glacier National Park and adjacent areas. Nearly all of the hundreds of eagles at the concentration must come from much farther away. Northern Canada has substantial populations, so the concentration is probably composed of eagles migrating south from Canada.

To determine precisely the source of the eagles and their destinations after departure from Glacier, in 1977 we began a study of the eagles' movements. During the autumns of 1980 and 1981, we attached small radio transmitters (weighing less than two ounces) to the two central tail feathers of 26 eagles. We used special receivers to follow the continuous signal from the transmittters. A small switch inside the transmitter changed pulse rate as the tail changed position, enabling us to determine whether an eagle

Figure 2—Winter locations (solid circles in the United States) and summer locations (solid circles in Canada) of bald eagles equipped with radio transmitters in Glacier National Park (large solid circle) in autumns 1979-1981.

was perched or flying at a given time.

Tracking (following the signal) was accomplished in a vehicle with an antenna on the roof and by flying in a light plane with antennas mounted on the wing struts. From the air, signals could sometimes be detected at distances of more than 100 miles. By following the signal to the point at which it was strongest, a precise location could be determined. Each transmitter had a different frequency, so the identity of each eagle was known.

The miniature batteries were designed to last about nine months. About the time the transmitter failed, the eagle molted, losing both its tail feathers and the transmitter package. In this way, an eagle does not carry a transmitter package beyond the time of its usefulness. New feathers replace those lost and the eagle shows no evidence of the sophisticated research tool it once carried.

Although our work is not yet complete, we can provide some preliminary results. All eagles tracked went south, down the Swan, Flathead, or South Fork valleys, where smaller but numerous concentrations occurred for several weeks. A few eagles stayed in Montana for the winter—in the Swan, Flathead, or Blackfoot River valleys, but most eagles continued to southeastern Idaho. Some wintered there, in the vicinity of American Falls Reservoir, while others went on to Utah, Nevada, and Oregon. One subadult wintered near Lake Tahoe, near the Nevada-California border, and an adult wintered near the Oregon-California border. Winter foods were largely jackrabbits, waterfowl, and carrion.

As spring arrived, the urge to return to their nesting territories stirred the adult eagles, on which we concentrated our tracking efforts in 1981. Northward movement was triggered by favorable south winds in late March and early April. Many of the eagles returned to the Glacier vicinity, but with no salmon available in the spring, movement north continued uninterruptedly. All of the tracked eagles were east of the Continental Divide by the time they were a few miles into Canada. The foothills along the east slope of the Rockies in southern Alberta provided favorable strong winds, allowing the eagles to move long distances daily (up to 350 miles, but averaging about 100 miles).

Although it was not surprising that the eagles moved into Canada, we had no idea how far they might go. By late March, one adult had reached her summer territory and had a mate and a nest. Her destination was another park—Wood Buffalo National Park on the Alberta-Northwest Territories border. In late July, the molted tail feathers with the transmitter still attached were found by Pat McClelland only one-half mile from the nest. Other eagles were destined for the Great Slave Lake area. Leonard Young followed an adult from southern Oregon to the Taltson River (a tributary of Great Slave Lake) in the Northwest Territories, a journey of 35 days.

The biggest surprise of all came from an adult nicknamed "Serendipity." She nested only 50 miles from the Arctic Circle, on Great Bear Lake—1,200 miles north of McDonald Creek. She had at least one eaglet in the nest when we saw her in mid-July 1981. Her last winter location had been the Wyoming-Utah border, so she had traveled at least 1,800 miles from winter to summer area.

Although many gaps remain in our knowledge of eagle movements, we can say that the eagles that concentrate in Glacier come primarily from the Mackenzie District of the Northwest Territories and from northern Alberta; a few come from northwestern Saskatchewan.

In addition to these discoveries, some very disturbing events have occurred during the study. Bald eagles face many hazards during their long migration and during winter in the states. Although the species is fully protected by three federal laws—the Migratory Bird Treaty Act, the Bald Eagle Protection Act, and the Endangered Species Act—many eagles are intentionally shot, carelessly poisoned or trapped, or electrocuted on power lines. During autumn 1980, a subadult was tracked from McDonald Creek to the Snake River, near Ontario, Ore., by Harriet Allen. When its signal suddenly became very weak, a search was begun. The eagle was finally found in a dump on private property near the river. It had been shot and buried at the dump to conceal the evidence. The person responsible had not noticed the transmitter,

concealed by the down feathers at the base of the tail. An investigation led to successful prosecution by the U.S. Attorney's Office. The eagle killer was fined $2,500 and given a 30-day suspended jail sentence. In June 1982, "Serendipity" (the eagle that had nested successfully at Great Bear Lake in 1981) was found dead on the ground under the nest tree. She apparently had been recently shot off the nest.

An adult eagle tracked from Glacier to Utah and then to Great Slave Lake was apparently on her way back to Glacier last autumn when she was found dead near Peace River, Alta. She was a victim of strychnine placed in a sheep carcass by a rancher trying to poison wolves. Use of strychnine in Montana for ground squirrel control is of concern because it poses a threat to eagles, as well as to many other wildlife species.

Trapping is currently the cause of other eagle losses. They are attracted to sets intended for furbearers, with baits visible to birds overhead and with steel-jaw traps next to the bait. Many die after being caught in a trap, even if they are released. According to Dr. Pat Redig, director of the University of Minnesota's Raptor Rehabilitation Center, any part of the eagle (toe, leg) below the point of trap-arm contact is almost always lost due to circulation problems and infection. The infection may cause subsequent fatality, even though there may be little visible damage at the time of release. Any leg injury is critical because eagles rely on their feet to catch prey. In an effort to reduce deaths of eagles and large hawks, Minnesota recently prohibited placing leg-hold traps within 20 feet of a bait that can be seen by soaring birds. Enactment of this regulation in Montana could reduce accidental deaths to eagles and other raptors.

A high level of productivity in Canadian nests or in the relatively few Montana nests is not sufficient to ensure the recovery and stabilization of bald eagle populations. Survival during migration and in wintering areas is equally important.

The future of the bald eagle concentration at McDonald Creek is tenuous. Although the kokanee is not native, in this case its importance to the endangered bald eagle at McDonald Creek transcends concern about its presence in a national park devoted to naturalness. The eagles need a stable kokanee salmon population that will provide a dependable food base. But the kokanee may be threatened by water quality changes that could result from the proposed Cabin Creek coal mine in Canada, or by the opossum shrimp, recently detected in Flathead Lake (see "Flathead's Bluebacks" in the July/August 1982 *Montana Outdoors*). This non-native shrimp has been implicated in the collapse of kokanee populations in several other lakes, including Priest Lake and Lake Pend Oreille in Idaho, and Whitefish Lake in northwestern Montana. Along McDonald Creek, people who enter the closed area represent a continuing threat to the concentration by frightening eagles away from feeding sites.

Some people tend to consider eagles that nest in the state as "Montana" eagles, and those that concentrate along McDonald Creek as "Glacier" eagles. However, bald eagles should not be viewed as belonging to any particular state, province, or country, but as an international resource. Glacier National Park is—appropriate to such a view—a World Biosphere Reserve, part of the United Nations Educational, Scientific, and Cultural Organization (UNESCO) system.

In Montana, we have the responsibility for proper management, not only of the relatively few eagles that nest in the state, but also for the hundreds that migrate through or winter here. Wildlife managers in Glacier National Park, the state of Montana, adjacent states, and Canada must work cooperatively to maintain an environment in which the bald eagle can continue to be the symbol of freedom. ■

The last of the American bald eagles?

The last passenger pigeon on earth died in a Cincinnati zoo in 1914.

We don't want the bald eagle—our national symbol—to face the same future. There are fewer than 1,400 breeding pairs of bald eagles left in the lower 48 states.

They have survived despite destruction of their nesting sites, indiscriminate shootings, and poisoning from insecticides like DDT.

We can keep these magnificent birds alive and free. And you can help.

Never approach an eagle's roosting or nesting place. Disturbing a nest is illegal—and it can cause adult eagles to abandon the nest for good. Learn to identify the eagle. Remember, it's against federal law to kill eagles, hawks, falcons and other birds of prey.

Learn about the needs of eagles. Volunteer to help your state conservation agency protect eagle habitat.

The National Wildlife Federation is working to save the eagle, too.

With the help of several American companies, the NWF purchased land where eagles roost and donated it to the American people for use as wildlife refuges.

Each year we conduct a census of the bald eagle population in the lower 48 states to help identify prime eagle habitats.

Through our Raptor Information Center the Federation conducts research on eagles, provides educational materials, and offers a $500 reward for information that helps convict anyone who kills an eagle.

You can support the National Wildlife Federation's program to save the bald eagle. Join us. Write the National Wildlife Federation, Department 101, 1412 16th St., NW, Washington, DC 20036.

Contributors

• **Riley McClelland** is an associate professor in the School of Forestry at the University of Montana in Missoula and also a research biologist in Glacier National Park. He has been involved in bald eagle research for more than 17 years. Dr. McClelland's article examines the evolution of the eagle concentration at McDonald Creek in the park, how the eagles found out about the area's kokanee, the relationship between the number and size of the kokanee and the length of stay of the eagles, where the eagles go when they leave the park, and threats to this endangered species. Turn to "McDonald Creek's Bald Eagles: An International Resource" on page. 2.

• In the vocabulary of those who write about outdoor literature, "Old Bugler" might be described as a "yarn." it's a story with an old man, a boy, and an elk which lives in an untamed part of the country. As hunting stories go, it's as true as any ever are, and more true than most. **Tom Butts,** who created it, is a department wildlife biologist in Roundup. Turn to his yarn on page 8.

The illustration for "Old Bugler" was created especially for this issue by **Robert Spannring.** His work is frequently seen in *Montana Outdoors;* it is also available from Hole in the Wall Gallery, Ennis; Bud Lilly's Fly Shop, West Yellowstone, and Mountain Meadowlark Gallery, Billings. He says of his work, "My interest is to portray wildlife in their habitat and address different political situations that arise in human and wildlife relationships (habitat preservation, hunting, other attitudes, etc.)"

• "Elk Success Story: An Overview" is a listing of the factors that have worked together to make elk one of Montana's most notable wildlife management success stories. As Wildlife Division Administrator **Gene Allen** writes, "Although elk are not our most plentiful wildlife resource in Montana, they continue to be one of the most desirable and sought-after big game species that Montana has to offer." His article begins on page 15.

MO is pleased to welcome the work of **Dan Coughlin,** Helena. His pen and ink illustrates the "Overview."

• Foothill zones are sought out as "A Winter Home for Elk." But these areas are also highly appealing to man. For a look at five winter ranges in southwestern Montana and their value to elk, other animals, and to Montana's recreationists, turn to page 17. As **Arnold Foss** and **Fred King** predict, these ranges will no doubt become even more important to future generations. Foss has been wildlife manager for the Bozeman region for the past 12 years. King has been a wildlife area manager for the past seven years; he is headquartered at Gallatin Gateway.

• In "Game Check Stations: A Wildlife Management Tool," **Graham Taylor** and **Mike Frisina** focus on the importance of the information gathered in making wildlife management decisions. Other functions of game check stations include assisting hunters by providing them with current information on conditions, enforcing Montana's game laws, monitoring hunter distribution and density, and managing special late or controlled hunts. Their article also includes a sidebar by Taylor on the Gallatin check station and by Frisina on the Gregson and Mill Creek check stations. Taylor is a wildlife biologist in the Bozeman region and spends much of his time with management and monitoring programs of the Gallatin elk herd. Frisina has been a wildlife management biologist in Butte for the past eight years. Their article begins on page 21.

• "The Forest Road Issue" is not new. The question facing resource managers today is: "How many miles of forest road are enough?" As **Mike Aderhold** writes, ". . . there must be a point at which the liabilities outweigh the benefits. From a wildlife and recreation perspective, we are approaching that point in some places." As he emphasizes, every year more hunters can get more places, leaving animals with fewer secure areas. His article also presents the road management policy approved by the Fish and Game Commission in October. Aderhold is the department's information officer for the Kalispell region; he has also worked with four federal agencies — the Corps of Engineers, Forest Service, Fish and Wildlife Service, and Bureau of Land Management. Turn to his article on page 27.

• **Paul Zarzyski** lives in Missoula. He is a poet who is also obsessed with riding rodeo broncs. Perhaps the melding of the two seemingly unrelated activities is one of the reasons his work seems so accessible, even to people who normally don't "take kindly to" poetry. In an interview in the Missoula paper a few years ago, Zarzyski said, ". . . when you find something that stretches your soul, you give it your all." For a bit of soul-stretching, turn to "On the Way to the Blind" and "Dekes," beginning on page 31.

The paintings accompanying Zarzyski's poetry were done especially for that purpose by Hamilton artist **John Michael Marion.** His snow geese painting was selected as the winning design for the 1979 Montana Bird Stamp from a field of 36 entries; he recently won the competition for Washington's Warm Water Fish Stamp with a watercolor of smallmouth bass.

• Large head with ragged, bushy crest. Slaty-blue back. Sitting motionless on a perch overhanging a body of water, watching for the fin of a fishy morsel to glide by. The belted kingfisher is fairly hard to confuse with any other bird. This "Beaked Fisherman" is also very good at capturing fish—and its only "tackle" is its beak. Turn to **Vince Yannone's** article on page 34. The department's youth educator, Yannone is well-known for his lively and informative television shows about Montana's wildlife.

Bob Story, Billings, has been a full-time wildlife artist since 1972. He has been featured at the Charles M. Russell Museum and Gallery in Great Falls. His work is available from the Hole in the Wall Gallery, Ennis. Of his work, he says, "I love to paint and observe wildlife as light and the changing seasons influence the endless moods and colors of their natural environments." See this underscored in his kingfisher illustration.

• Most hunters don't expect that it will happen to them. They don't plan on becoming stranded and having to spend the night outdoors. They don't expect to get lost. But, as **Bob Miller** writes, these things *do* happen, and the best thing a hunter can do is to plan ahead. Miller has provided a list of "Survival Basics"—some rules, as well as specific suggestions on what to carry with you on *every* outing. Miller has had extensive training in both winter operations and survival with the U.S. Army. He is the safety administrative officer with the department's Law Enforcement Division. His article begins on page 36.

• **Special thanks to Janet A. Hayes,** Great Falls, and **Barry L. Syler,** Klamath Falls, Ore., for their pen-and-ink illustrations. And our appreciation to the following photographers: **Larry Dech,** Grand Haven, Mich.; **Vince Fischer,** Butte; **Louis M. Kis,** Kalispell; **Mike Logan,** Helena; **Bill McRae,** Fairfield; **Gary Strobel,** Bozeman, and **Tom Warren,** Helena.

We sat around the campfire, Ned and I. The night was a well-worn buffalo robe wrapping itself snugly around us. As the fire gently crackled, Ned was thinking back over his first day of elk hunting and forward to his second. "Grandpa, do you think we'll see elk tomorrow?"

"We might, but I wouldn't count on it. Hunting elk usually amounts to a lot of hunting and very little getting. We did find fresh sign today, so we'll hunt that area tomorrow. We might get lucky."

"I really want to get an elk," Ned said. He mulled over that awhile, then looked up at me. "Tell me about your best elk hunt, would you, Gramps?"

I gazed at the fire as I tamped the coals in my pipe and relit it with a wooden match. "Well, son, I guess that'd be when Smoke and Gofer and I went after Old Bugler for the last time. That was a good while ago, before you were born. Old Bugler lived away up in a secluded valley, just about as pretty a place as you're ever likely to see. In those days, we had it about to ourselves, that is Smoke, and Gofer, and me, and the elk, and eagles, and all."

"Is this a true story?" asked Ned, skeptically.

"It's as true as any hunting story ever is and more true than most," I answered, as I winked at him. His wry grin and warm eyes told me he knew plenty about my hunting stories.

"Well, now," I began, taking a puff on my pipe, "Old Bugler and I first met up early one morning as I led Smoke into a small meadow while I was scouting elk sign. It was late September as I recall, and downright cold that morning. The sun wasn't up yet, and the frost was heavy on the grass. It was so calm the gold and yellow aspens weren't even quaking. Smoke and I sidled into that clearing and all of a sudden, Smoke let out a startled snort. I looked up right into the eyes of the biggest dog-gone bull elk I'd ever seen. He wasn't more than 30 yards away, and he was just staring at us."

"What happened then?" asked Ned.

"Well, I looked at him, and he looked at me. He wasn't afraid at all. Then he laid back his ears and reared back his head and bellowed out the longest, loudest consarned bugle I ever heard. My hair raised my hat, I swear. Then he let out a series of grunts and brays that'd make any jack mule jealous. After all the ruckus had quieted down, he gave me a defiant look and flat-out vanished, like he'd never been there. I knew right then and there I'd never rest easy until I got that elk, no matter what it took. That's when I named him Old Bugler.

"It took me five years. Five years I spent riding the ridges and walking the side slopes of that valley. I hunted hard every season. Oh, I saw plenty of other elk—some nice bulls, too—but I wanted Old Bugler."

"You mean you never saw him again in all those five years?" asked Ned, as he put a few more sticks on the fire.

"I saw him once or twice every year, but something always went wrong. Sometimes I'd just catch a glimpse of him standing on a rise a long way off, or maybe I'd catch him in the timber close up, but he'd always vanish before I could get my sights on him. Once he showed up in camp while I was making coffee, with my rifle propped against a tree just out of reach. Another time I nearly ran into him on a trail while I was riding Smoke and trailing Gofer. Every time I saw that bull, he'd look at me like he was taunting me, then he'd be gone. And every time he looked bigger."

"How'd you finally get him?"

I took several puffs on my pipe. "Boy, after hunting that bull for five years I was learning his habits pretty well. I knew just about where he should be. One day Smoke and Gofer and I were packing up the trail, it was early November, and a light snow was falling. I remember telling Smoke I just knew this time we were going to get Bugler. Gofer didn't look any too happy about that because she knew she'd be doing the packing."

"Why'd you name your pack horse 'Gofer,' Grandpa?" interrupted Ned.

"Don't you remember Gofer? Guess maybe you weren't knee high to a short sheep when she passed over the Great Divide. Boy, she was the best mountain horse a man could ask for. She'd go anywhere, pack in or out, whatever was needed, with no complaining. But give her half a chance, and she'd 'go fer' home."

Ned laughed.

"Anyway, I knew just about where to look for Bugler, so after setting up camp I headed out to scout for fresh sign. It took awhile,

Old Bugler

by Tom Butts
illustration by Robert Spannring

but I found what I was looking for. From the size of the tracks in the new snow, there was no doubt about whose they were. The snow had tapered off, and dusk was settling in. Judging where the tracks were headed, I had a real good idea where I'd find Old Bugler first thing in the morning.

"As I rode back to camp, the snow began again. The distant ridges became fainter, and the soft, quiet whiteness soon greyed, then faded to a hushed, wet darkness with only the faint hiss of the snow in the pines, the crunching of the snow under the horses' hooves, the creak of the saddle, and my thoughts to keep me company. I've never been happier, for I knew Bugler and I would meet early the next morning."

"I'll bet you didn't sleep much that night!"

"You'd lose that bet," I replied. "I was plumb tuckered, and I was so content with the knowledge that my five-year hunt was nearly over, that I slept like a hibernating grizzly. You can bet, though, that when I woke up I was plenty excited. It was a good three hours before first light. I had to force myself to make some breakfast because I knew it was going to be a long day. Then I saddled the horses and soon we were breaking trail through a foot of new snow. The storm had blown over, and the sky had cleared. I could make out the trail in the crisp starlight, though I think had it been a coal-black night, Smoke would have known right where we were headed. It was downright frigid that morning as we plodded up the trail, but I was warm all over.

"By the time the first faint light painted the eastern sky, I had left the horses behind and was perched on a rock outcrop overlooking the small clearing where I knew Bugler would come to feed. The chill was sinking in, but it wasn't the cold I was shaking from. The minutes dragged by, and it was all I could do to stay put.

"The sun hadn't broken over the ridge across the valley when suddenly I heard a branch crack behind me. Behind me—damn! I knew when I turned around that I'd see Old Bugler staring right at me, and with his defiant 'whoof' he'd be gone. Damn!

"I looked slowly around and, sure enough, there was Old Bugler. He couldn't have been more than 50 yards away, and he was broadside. But he wasn't looking at me. He didn't know I was there! Slowly, carefully, I raised that old, weather-beaten .270 until the sights rested on his shoulder. He was magnificent. I was sure he would hear my heart pounding, it seemed so loud. I had to breathe deep to steady myself. Then he looked at me. 'Pull,' I yelled to myself, 'before he's gone!' But I didn't, and he didn't leave. I smiled as I lowered my rifle and stood up. He watched me for what seemed an eternity, then ambled into the timber."

Ned was incredulous. "You didn't shoot?"

"Nope."

"Why?" His tone was almost one of despair.

"Son, for five long years that bull had made a fool of me, or so it seemed. Then I got the better of him, and he knew it. But suddenly I couldn't imagine a world without Old Bugler in it—defiant, roaming those wild places. Believe me, I got more than I bargained for."

Ned looked at the fire for a long time, stirring the coals with a stick. Finally, he looked at me and asked, "Do you think he's still up there, roaming those hills?"

My pipe was out. I waited awhile, caught up in my memories. "Ned, it's been quite a spell since Old Bugler was in his prime. He's no doubt gone to dust by now. But I like to think that his spirit is still up there, and that every September his bugling rings out long and loud between those ridges. And I like to imagine him greeting every intruder into his domain with a defiant snort."

The fire was just glowing coals now, and the chill night air made both of us shiver. A great horned owl hooted from the timber on a far ridge. Finally, Ned asked, "Do you think I'll ever see an elk like Old Bugler?"

"Son, there are hardly any elk like Old Bugler. But if you hunt long and hard, I'm sure you'll find him way up there near where the rocks touch the sky. And you'll be glad you spent the time looking." ■

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The Catchall

Learning Wildlife in Public Schools

Folks who manage fish and wildlife have a lot of dreams. Many dream of light winters or damp summers where all creatures survive well. They also dream of an end to conflicts between land developers and wildlife habitat, of completing seemingly endless planning, zoning, or environmental impact statement reviews, and of hunting and fishing seasons where everyone is satisfied with the results.

Unfortunately, most dreams do not come true.

High up in the priority of managers' dreams is one of a public that understands the needs of fish and wildlife and is supportive of conservation efforts. Usually this dream also melts away with the dawn. But a new effort under way may gradually change all this.

Project WILD is a unique environmental and conservation education program emphasizing wildlife. The heart of this educational endeavor is a group of instructional activities designed for teachers to use both inside and out of the classroom.

Project WILD materials are being written cooperatively by classroom teachers and other educators, resource agency personnel, members of private conservation groups, and other community representatives. The set will contain teaching activities designed for use in all major subject and skill areas presently included in kindergarten through high school curricula. Suitability for school use and elimination of bias will be ensured through extensive field testing plus review by a wide range of wildlife interests.

Wildlife is a source of fascination and interest to almost everyone. In the classroom, wildlife can be an especially useful tool for motivating students in traditional subjects like language arts, math, history, and even music. For this reason, Project WILD does not treat wildlife narrowly. In addition to providing activities to incorporate wildlife concepts into major subject areas, the activities will also allow students to consider wildlife in relationship to the total environment, including humans.

In this effort, wildlife is considered as all nondomestic animal life, from microscopic to the great whales. Each activity is based on one or more concepts ranging from simple awareness to responsible human actions toward wildlife and the environment.

Development of this wildlife education project is a cooperative effort of the Western Association of Fish and Wildlife Agencies and the Western Regional Environmental Education Council (WREEC). The latter is a consortium of educators and state resource agency people from the 13 western states. Western association membership includes state fish and wildlife agencies in the same 13-state area, including the Montana Department of Fish, Wildlife and Parks.

At present, there are few comprehensive major wildlife education programs in this country. While there is an abundance of wildlife material produced by state, federal, and private groups, there is little actual curriculum material available for immediate use by teachers with their students.

Other wildlife education efforts have mostly focused on materials that provide information on wildlife, their life histories, management programs, or a perspective on some wildlife-related issue. Much of the content of this material is excellent. To use this type of content-based item, however, most teachers must make room for an extra subject in an already full curriculum. Consequently, this "add-on" form of material has had limited success in today's classrooms. Wildlife can seldom be put into the curriculum as a separate subject. Instead, wildlife conservation must be integrated into required subjects.

It is not wise or desirable to produce materials designed to displace any of the curriculum that now exists. Enhancement and enrichment of existing curricula *are* desirable. Historically, teachers have avoided most agency-produced, content-based literature in favor of that which involves investigation, questioning, data gathering, critical thinking, and valuing skills. Project WILD will provide this opportunity plus the translation process necessary to make many wildlife materials widely available today more usable by classroom teachers. Project activities do not take a stand on issues such as predators, hunting, or land development. They do provide a means for teachers and students to investigate such issues, interpret their findings, and reach their own conclusions.

Project WILD is more comprehensive than just interpretation of issues and use of agency literature. The activities are based on a framework of concepts that begins with simple awareness of wildlife around us and progresses through wildlife values, ecological relationships, management programs, cultural interactions with wildlife, and finally an examination of wildlife and responsible human actions. Although being developed in the West, the wildlife concepts in the framework apply nationwide, if not worldwide.

Although unique to wildlife education, Project WILD is not original in its approach to introducing nontraditional subjects to schools. It is being developed in much the same manner as another very successful cooperative effort of WREEC and the American Forest Institute known as Project Learning Tree (PLT). PLT focuses on the forest environment in much the same way Project WILD will deal with wildlife resources. Introduction of PLT materials into the school systems of the West began in 1976. It is now being used in more than 30 states and three Canadian provinces.

Like PLT materials, Project WILD teacher activity guides will not be

Wildlife Shorts

Animals in the wild get ailments just like those of humans. Such things as bacterial infections, viruses, skin and circulatory disorders, tumors, and even impacted teeth are common in wild animals.

* * * * *

Some moth eggs are rectangular. The moth deposits them in rows that look like an experiment in laying miniature bricks.

* * * * *

Honeybees are social insects. The queen lays the eggs; the males, or drones, serve only to fertilize new queens. Thousands of sterile females, or workers, build and guard the hive, provide food, attend the queen, and rear the young.

available just for the asking. Educators are emphatic that such materials not be just handed out without an introductory process covering use techniques, philosophies, and relationship to other parts of the school curriculum. Materials that are "just handed out" often end up gathering dust on a shelf. Project WILD resources will instead be introduced to teachers and their administrators through workshops involving the state fish and wildlife agency, the state department of education, and often private wildlife interest groups. These workshops will show teachers how wildlife can be infused into existing classroom subjects and used to enrich current educational efforts.

Young people between the ages of 5 and 18 comprise up to 25% of our population. Thus, school systems can directly reach up to a quarter of the people of each state. Over 10 million students and a half million teachers interact daily in classrooms in the western states alone. An additional quarter or more of each state's population is made up of parents of school children. School systems thus provide an effective channel for helping young people, their parents, and teachers gain a better understanding about wildlife. Providing high quality, nonbiased, readily usable material is the key.

Although Project WILD has been under development for almost two years, it will be nearly another year before it enters classrooms in a major way. Most of 1981 was devoted to drafting teaching activities and the curriculum framework. Testing and evaluation followed. Already under way is a testing effort to ensure the activities can be done by teachers with students in the targeted grades and subject areas. An effort begun in 1982 will document what students learn by experiencing these activities. These important steps have previously been overlooked in preparation of most wildlife education materials. Thanks to the guidance of a broad-based project steering committee, this current effort will provide a major departure from previous attempts at wildlife education.

The benefits of having a public that is informed about and supportive of any program is incalculable. By fall 1983, Project WILD will be ready to provide a level of wildlife literacy not possible before. Schools and teachers will also have an additional motivation tool to make students more eager learners. Like any education process, it is a long-term investment. Education requires a patient, consistent approach over many years to be successful. Project WILD will not quickly eliminate the problem wildlife face through misunderstanding, economic pinch, or threats to habitat. It cannot deal with daily crises that will still erupt. No education program can. That is not the nature of education. Project WILD *will* provide an exciting new dimension to wildlife education and current school curricula. It is a creative step toward making a dream come true.—*Cliff Hamilton*

• *Cliff Hamilton is a member of the Project WILD steering committee and is education supervisor for the Oregon Department of Fish and Wildlife.*—Ed.

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Posewitz Receives MEIC Award

Jim Posewitz, administrator of the department's Ecological Services Division, has been honored as "Conservationist of the Year" by the Montana Environmental Information Center (MEIC). MEIC is a nonprofit public interest group, composed of a cross-section of Montanans and dedicated to preservation of Montana's natural resources. Posewitz received the award in September at the group's annual rendezvous.

The award was presented by Phil Tawney, Missoula, one of MEIC's founders. Tawney said, "The thing that stands out so strong in this man's character is his commitment, his dedication, his genuineness, and his love of life. You name the resource battle, and he has been involved."

Posewitz is recognized as "the brains behind the Yellowstone water

Jim Posewitz

allocation process," Tawney said, referring to the instream flow provision. "As long as that decision stands," Tawney noted, "the Yellowstone will remain the longest free-flowing river in the nation, with its riparian wildlife habitat and outstanding fishery intact."

In 1974, Posewitz received one of 10 prestigious American Motors Conservation Awards presented nationwide to professionals in the conservation field. In 1981, the Montana Wildlife Federation named him "Conservationist of the Year."

He joined the department in 1961 as a fisheries biologist and became fisheries manager for the Glasgow region in 1962. He was named head of a newly formed Division of Environmental Resources in 1969 and became head of the new Environment and Information Division in 1972. He has been administrator of the Ecological Services Division since 1977.

Wild Horse Gets Three

Three wild horses captured near Rock Springs, Wyo., were released on Wild Horse Island Oct. 3. The three geldings were transported to the island on a barge. Assisting in the transport and release were personnel from the Parks Division in the Kalispell regional office of the Department of Fish, Wildlife and Parks and Hodge's Marine Construction Service, operators of the barge.

Ron Holliday, administrator of the DFWP Parks Division in Helena, said news of the mule dying on the island last spring (see *Montana Outdoors*, March/April 1982 and May/June 1982) generated a number of letters from persons urging the department to transplant wild horses onto the island. Three horses from the Bureau of Land Management's "Adopt-a-Horse" program were available and department officials and members of the island planning task force favored the idea.

The three horses are 9, 13, and 17 years old and since all three are geldings, there will be no possibility for reproduction and subsequent overgrazing. Tom Hay, supervisor for DFWP's Kalispell region, said the three horses and the old horse already on the state-owned island should not compete for forage with the island's 56 sheep and approximately 30 deer.

Holliday noted cost of acquiring the horses was zero, so transportation was the only expense. He said a few horses on the island would add to its appeal and carry on a tradition of nearly 200 years. If no horses had been transplanted, that tradition soon would have died; the one remaining horse on Wild Horse Island is over 36 years old and cannot be expected to live much longer.

Western Association Selects Newby

The Western Association of Fish and Wildlife Agencies has selected Fletcher E. Newby as an "honorary member." The association is comprised of members from 13 western states and two Canadian provinces; the group meets annually to consider mutual problems and to provide a forum for exchange of both administrative and technical information. Newby's award was announced at this year's meeting in Las Vegas. Newby retired as the department's deputy director late in 1980.

In nominating Newby, Department of Fish, Wildlife and Parks Director Jim Flynn cited his professional service to the department, to the Western, and to natural resource concerns of member states.

Newby joined the department in 1951 as project leader for fur animal investigations; in 1956, he became the senior biologist and project leader for fur animal, predator, and bear research and management. In 1959, he was named to head big game management and research, and, in 1963, he was promoted to district supervisor for the department's south central region. He left the department in 1971 to become executive director of the Montana Environmental Quality Council, a position he held until accepting the department's deputy directorship in 1974.

While with the department, he conducted an aggressive fishing access, wildlife habitat, parks, historic sites, and recreation area land acquisition program. He has received many professional honors and awards, including one year as president of the Northwest Section of The Wildlife Society. He was a long-standing member of both the Indian Affairs and Endangered Species committees of the Western and International associations.

graphics: Janet A. Hayes

Bighorn Blindness

Early last winter (December 1981), several bighorn sheep in Yellowstone National Park became blind as a result of a bacterial infection. The incident was apparently the first recorded case of "pinkeye" in wild bighorn sheep (*Ovis canadensis*). A summary of the results of investigations after the first report of the outbreak follows:

On Dec. 7 and 8, Montana Department of Fish, Wildlife and Parks personnel conducted an annual survey of bighorns adjacent to Yellowstone Park to obtain sex and age classifications for future management recommendations. At that time, one ram in the Buffalo Mountain area near Gardiner was noted as being blind. On Dec. 13, visitors to the park notified park personnel that a number of bighorn rams were blind in the Mount Everts area adjacent to Buffalo Mountain.

Initial field surveys by park personnel of the bighorn population which winters in the Mount Everts area indicated both sexes and all ages showed some incidence of an eye problem; the incidence was highest in rams. Field surveys also showed a lower to nonexistent incidence in sheep groups elsewhere on the northern winter range within the park. Field surveys by state personnel in areas adjacent to the park indicated no incidence in those sheep populations.

After consulting veterinarians, park authorities suspected the condition was attributable to keratoconjunctivitis, or pinkeye, similar to that found in livestock. Necropsies conducted by the Montana Department of Livestock Diagnostic Laboratory at Bozeman confirmed the condition and subsequently identified the causative organism as *Chlamydia* sp.

The following synopsis of the disease was given by Mary Meagher of the

National Park Service in a recent report:

> The outbreak probably began in mid- to late October [1981]; a ewe apparently suffering from this condition was seen Oct. 31. The extent of the outbreak was influenced by the coincidence with the movement of the bighorns to winter ranges and the onset of the rut. Transmission apparently peaked during the rut and dropped abruptly thereafter in late December.
>
> The course of the disease, based on the field observations, appeared to have been: (a) incubation for perhaps a week; (b) a period of intense irritation with copious discharge; eye or eyes partly to completely closed, sometimes with obvious swelling of lids; (c) affected eyes a cloudy, milky, blue-white, generally open, sometimes less so in bright light; discharge generally less; (d) eye ruptured, eye blind, *or* healing process began. Some eyes showed dense, white scar tissue, which in some cases appeared to be a permanent condition of a blind eye. Healing became apparent from perimeter to center, with gradual shrinking of scar tissue. Eyes of individuals were commonly observed to be in differential stages of the disease.

Although all the infected bighorns did not die as a result of the outbreak, at least 98 bighorns were known dead (from all causes) by spring. Seventy-two died in the Mount Everts area, and 26 died in an area near Tower, all within Yellowstone National Park. Most of the mortality occurred through falls or from starvation resulting from inability to forage and shelter adequately.

The exposed population of bighorns was estimated by park officials to number around 300 sheep, of a total park population of 550 to 600. Aerial surveys in April did not add to these figures appreciably.

Although one may speculate that some treatment could have been used to lower the mortality, the disease was determined by park officials to be "natural" in the environment. Realistically, little probably could have been done that would have altered the final outcome.—*Glenn Erickson, special projects bureau chief, Wildlife Division*

The Value of Blaze Orange

Many factors affect safety during hunting seasons. The hunter's alertness, attitude toward and knowledge of firearms, concern with safe hunting practices, and visual acuity, to mention a few. The last two points relate directly to fluorescent color—called blaze orange or hunter orange. While a colored garment worn afield isn't going to guarantee complete immunity from a hunting accident, it might prevent somebody from mistaking you for a game animal. The right color makes you contrast with the surroundings which lessens the chance for accident.

At one time, red was an accepted color for hunter clothing, but optical experts have proved that red cannot be seen very clearly in dim light, such as dusk and dawn. They have also proved that yellow can easily be mistaken for white—this can result in fatal mistakes in white-tailed deer country.

Research has shown that blaze orange is the color most visible to other hunters. In Montana, a big game hunter (or someone accompanying a hunter as an outfitter or guide) must wear an exterior garment above the waist of not less than 400 square inches of hunter orange material—and the material must be visible at all times while hunting.

The big advantage to blaze orange is that it is out of place in nature and therefore unlikely to be taken for any other color. It also stands out better than any other color at the critical times of dusk and dawn. Tests done by Dr. Gordon L. Wells at the School of Optometry, University of California, have shown approximately 8% of the country's population is afflicted with color-deficient vision—color blindness. And those afflicted are almost exclusively male. But blaze orange can be easily seen by persons with normal vision and also by those with varying degrees of color deficiency.

If you have hunted with a partner, you know the value of blaze orange. The color shows up in thick timber and brushy areas when you can't even see the outline of your partner's body.

Several years ago, a friend shared an experience with me. He had done some preseason scouting and located a sizable elk herd with several large bulls. The day before the big game opening, he packed his gear, walked into the area, and slept there. This put him in prime hunting ground before anybody else could get there. He ate cold beans that night because he thought a fire might frighten the elk. Just before daybreak, he ate an apple and a peanut butter sandwich and walked to the top of the ridge. Checking wind direction, he moved quietly to the edge of an opening surrounded by trees. The week before, he had seen elk feeding here, but now no elk were in sight. But something else was. As he checked the timber around the park, he could see several spots of blaze orange. Checking the area with his binoculars revealed several hunters, about a hundred yards apart. He was then convinced of the effectiveness of blaze orange in the field.

No matter what your feelings are about wearing blaze orange, statistics show it reduces the number of hunting-related accidents. If its use means mistaking a hunter for a game animal will become a thing of the past, it's well worth the effort.—*Vince Yannone, youth educator, Conservation Education Division*

Elk Success Story: An Overview by Gene Allen

Although elk are not our most plentiful wildlife resource in Montana, they continue to be one of the most desirable and sought-after big game species that Montana has to offer. Elk have a fairly wide distribution; they live in a variety of habitats, mostly on public lands, and their numbers have remained relatively stable—or have even increased—over the last several decades. Each factor has contributed to making elk one of Montana's most notable wildlife management success stories.

We can measure the success in a number of ways: (1) We have elk in more places than we had several decades ago. The Missouri Breaks elk herd is an example of a substantial herd in an area where, in the recent past, there were none at all. (2) Over time, Montana's elk numbers have gradually increased.

Two major reasons for the success are: (1) Most elk inhabit areas not permanently occupied by people. (2) Elk utilize fairly large home ranges. Land uses that affect a relatively small acreage—because it is only a small portion of an elk's home range—tend not to be as disruptive for elk as the same land use practice might be for an animal whose entire home range has been affected.

Another primary factor contributing to Montana's success story is both cause and result: the stability of our elk population. Most elk herds do not experience severe fluctuations, like some of the other big game and small game animals. This is partly because of their adaptability, the stable nature of their habitat, and the stable nature of the animals themselves—they are a fairly long-lived species. The recruitment rate (the survival of young required to offset adult mortality) necessary for a long-lived population is lower than for some other wildlife populations. This is an advantage and contributes to stability because weather and other happenings have less impact on adults than on young.

Other articles in this issue address various subjects that are part of the requirements for successful elk management programs. An important part of the success story has been acquisition of key winter ranges that permanently support and stabilize elk populations in those areas (see the article by Arnold Foss and Fred King). These lands form only a fraction of one percent of the land base of Montana, but they support as many as 10% to 15% of the state's wintering elk. In some areas, the elk utilizing forest lands during summer and fall would not be there, at least in those numbers, without the state-owned game ranges. The importance of winter game ranges and their contribution to the stability of Montana's elk populations cannot be overemphasized.

The department's elk management program has not been without problems. It has not been easy to try to walk the middle between not enough elk for people and hunters, and too many elk for private landowners. As economic pressures increase for private landowners, this aspect of our program becomes more difficult. In addition, the department faces its own set of economic pressures. Because of the department's financial situation, we

photo: Louis M. Kis

have not been able to purchase big game winter range for the last few years. Hopefully, over the next few years, we can again put ourselves in a financial posture that will allow us to acquire big game habitat into the future, primarily to help maintain the populations we have now.

Both direct and indirect pressures on elk are constantly increasing. These pressures take various forms, and they are not all pressures on individual elk. Many of the pressures are on elk habitat—which directly affects elk and populations of elk. Elk are large animals with significant habitat and forage requirements. These requirements are also important to other economic pursuits: timber harvest and cattle grazing are only two examples. Other activities, such as subdivisions and power lines, can also encroach upon important elements of elk habitat. All of these can be expected to affect elk and our elk management program.

One aspect of elk management is elk hunting opportunity and the concerns the department has for the future. Elk hunting opportunity gradually increased into the 1960s. From then to the present, elk hunting opportunity has become more and more restricted. This has been necessary as elk became more and more vulnerable, and as hunters increased in number and became capable of reaching all corners of an elk's range. As a result, elk are no longer secure in their habitat.

There are a number of ways to cope with this. But the end result is always the same: As elk security diminishes, more restrictions are placed on hunters. These restrictions can take many forms; One, of course, is reduction in number of hunters for a given area. More desirable would be trying to maintain opportunities for everyone, but cutting down on the length of time a person can hunt, splitting seasons, restricting the number who can hunt antlerless animals, and trying to maintain the universal opportunity to hunt bulls. The most restrictive should be considered as a last resort: permit-only hunting.

As uses of public lands increase, the long-term trend will be toward more restrictive hunting. Even now, as the bull elk harvest rate increases and the average age of bull elk becomes younger, we are hearing more and more people complaining about the quality of their hunt. They no longer see as many large or mature bulls as they used to, and, for them, the quality of their hunt is reduced. This aspect of quality is another whole element of elk hunting (or hunting of any kind, for that matter). Few people still hunt for subsistence. It is largely something we left behind many decades ago.

graphics: Dan Coughlin

Many factors have contributed to making elk one of Montana's most notable wildlife management success stories.

Hunters' concern for the lack of large bulls is, in most instances, not because of the biological need for large animals for breeding purposes. It is mostly for the element of quality that some hunters perceive a large, mature bull adds to the hunting experience. For some, the opportunity to take a larger, "trophy" animal is part of the experience.

These are some of the questions we will be pursuing with sportsmen more and more as time goes by; we will be asking them to comment on management directions that are not biological in nature.

The articles in this issue discuss some of the economic values of elk and other wildlife. Although they have value, wildlife are nonmarket goods and it is very difficult to come up with techniques to compare the value of them with other consumer products. However, the intense demand for other products of public land is making it necessary that we become more involved in the economic aspects of hunting and the values of wildlife. Efforts will be expended in the coming years toward this end. If wildlife are going to compete and maintain their well-earned places in the Montana scene, they are going to have to compete economically as well.

The long-range prognosis for elk and elk hunting depends on what scale of values one wants to use. We will be able to hunt elk for a long time but, as already mentioned, the hunt may not be the same 20 years from now as it is today. That doesn't mean that it may not be as good, but it might mean that in order to have an acceptable experience, a hunter may not have the opportunity as often as he does now. A kind of rationing of opportunity may be necessary.

In the coming months, readers will be hearing more and more about road management (see Mike Aderhold's article). While timber harvest is a necessary and desirable part of the Montana economy, the roads associated with timber management have probably had the greatest impact on elk of any single element. There are many alternatives for road management. The department is working with public agencies and large private corporations at this time to try and formulate a timber program—without any additional miles of open roads. Increased timber removal can, in part, be mitigated by closing roads and maintaining some restrictions on the access to an area during hunting season.

There are ways that the department can—and will have to—do a better job of integrating elk with other land uses. If we expect the other users of land to welcome elk with open arms, we are going to have to do something to make the competition more palatable. One thing that we have been doing (and expect to do even more of in the future) is to exchange grazing. Elk are allowed on private land during a portion of the year, and domestic livestock can graze on certain portions of some of the department's wildlife management areas.

We realize that a sound elk program cannot continue to exist and hunters cannot continue to be welcome if we are only good stewards of our property—we must be good neighbors as well. We have improved our status as neighbors, and we expect to continue to work on improving our relations with adjoining landowners. ■

A Winter Home for Elk

by Arnold Foss and Fred King

As summer's lazy days pass and the lush green mountain meadows take on autumn's golden tinge and finally a frosty mantle of snow, the simple matter of finding the next meal becomes a major chore for Montana's elk.

During summer, mountainous terrain provides adequate forage and cover. But as snow accumulates in the higher elevations, the search for forage gets tough, and elk start their annual trek to the foothills where they will winter. Elk are creatures of habit and can be counted on to seek the same winter ranges year after year. In much of Montana, winter range is in relatively short supply, usually accounting for less than 10% of a land area usable during summer months.

An elk winter range has many important characteristics, of which the most essential is an ample source of forage. The elk is an adaptable animal and can use grasses or woody vegetation for its winter diet. In southwestern Montana, grasses form the bulk of the winter food supply.

Winter ranges are usually on southern or western exposures in foothills, where wind action and sunlight combine to lessen snow depths and make forage more readily available. Irregularity of terrain and dense timber stands near foraging areas supply another very essential ingredient—cover—which provides an escape zone from chilling winter winds.

Man did not decide where elk should live during winter. He learned what was necessary by observing the areas selected by the animals. Consistency in their choice of sites made it possible to determine the essential characteristics and specific locations of these areas. The characteristics have not changed apprecia-

photo: Mike Logan

bly over time. Sites exposed to sun and wind are essentially the same today as they were before man came on the scene—and elk have sought out these areas through the years.

But foothill zones are also highly appealing to man. For example, they provide choice summer pastures for domestic livestock. Most of Montana's foothill ranges are privately owned and are an important part of livestock operations. Most are grazed annually by livestock which remove much of the forage historically available to elk and to other wild animals. However, private lands provide a substantial amount of the winter range used by elk in Montana. In these situations, the number of elk that can be carried depends on the individual landowner's tolerance to elk and the economic conflict that results when elk remove forage the owner needs for his livestock.

"In much of Montana, winter range is in relatively short supply, usually accounting for less than 10% of a land area usable during summer months."

Elk are gregarious and predictable, and they can have substantial impact on the land. Because of man's interest in using these same areas, it became apparent to the Department of Fish, Wildlife and Parks that if significant numbers of elk were to be maintained for the people of Montana, it was essential to put some of the important winter ranges into public ownership. These lands could then be managed to give elk first priority for winter forage. Livestock and other land uses could be excluded or regulated as necessary.

Passage of the Pittman-Robertson Act by the U.S. Congress in 1937 and passage of the necessary assenting acts in 1941 by the Montana Legislature provided the first real opportunity for the department to acquire some of the more important foothill areas that would give elk permanent winter range. These acts provided a funding source for wildlife restoration activities by assigning a federal excise tax on weapons and ammunition. These taxes were then distributed to the states for wildlife management purposes. The winter ranges discussed in this article were purchased for elk and other big game animals through the federal Pittman-Robertson program. Seventy-five percent of the funds came from the federal excise tax, and the remaining 25% from Montana hunting license sales. In simple terms, the funding was provided by sportsmen from money paid for hunting licenses and federal excise taxes on sporting equipment.

Various people and groups view acquisition of land for big game winter ranges in Montana differently. Some have strongly supported the concept; others have opposed it. One objection has been that public acquisition of land removes it from county tax rolls. To alleviate this concern, the department pays an in-lieu-of-tax to the county in which the land is situated. This fee is similar to that paid by a private individual for the same land base. Other people object to more land in public ownership in a state such as Montana where approximately 30% of the land is administered by public management agencies. However, those aware of the quandary that elk and other big game species are in have been highly supportive of acquisition efforts and were grateful for an opportunity to provide a permanent range for elk.

A look at some of the winter ranges in southwestern Montana will indicate what these acquisitions mean to Montanans today and to future generations.

GALLATIN

Sportsmen's money was put to work in 1945 when the department purchased 6,188 acres in the Gallatin Canyon, 50 miles southwest of Bozeman. This purchase would mark the beginning of acquisition of five major big game winter ranges in southwestern Montana. Through additional land purchases in the Gallatin Canyon, the department today holds title to 7,313 acres. In addition, the department also leases 3,200 acres from Burlington Northern Railroad. These acres form the Gallatin Wildlife Management Area (all wildlife management areas were previously called "game ranges").

The Gallatin Wildlife Management Area (WMA) provides and assures winter forage and cover for a segment of the Gallatin elk population. The major portion of the population is migratory, wintering on the wildlife management area and summering in Yellowstone National Park. A small segment of it resides year-round in the Gallatin area, summering primarily in the Gallatin National Forest. Because of their scenic beauty and proximity to Yellowstone National Park, these lands satisfy many outdoor recreation needs of the public. Currently, private holdings in the Gallatin are being developed as recreational complexes or as speculative real estate investments. With this trend in land use, elk populations cannot be maintained without year-round ranges under public title. The Gallatin WMA fills the winter segment of this need, and 400 to 500 elk winter there.

The Fleecer Mountain Wildlife Management Area, near Butte and Anaconda, provides year-round habitat for elk, mule deer, moose, and other wildlife, as well as winter forage and cover for more than 1,000 elk (photo: Vince Fischer).

BEAR CREEK

A segment of the Gallatin elk population annually migrates from summer range in Yellowstone Park to a historic

wintering area near Bear Creek in the Madison drainage. In July 1954, the department made the first purchase of land in the foothills east of Cameron which would later be known as the Bear Creek WMA. This area now comprises 3,456 acres of elk winter range. It provides a winter home for over 500 elk and several hundred mule deer. Approximately half of these elk summer in the Madison drainage, and the remainder are migrants from the Gallatin drainage.

WALL CREEK

The Gravelly Mountain Range is recognized as an area that provides abundant big game hunting opportunities. In November 1960, the department first purchased land that would become the Wall Creek WMA. Situated 25 miles south of Ennis in the eastern foothills of the Gravelly Range, this area consists of 5,829 acres of deeded land and an additional 918 acres leased from the Montana Department of State Lands. This range provides year-round habitat for a variety of wildlife and permanent winter range for over 700 elk. Before the acquisition, the same area carried approximately 150 elk during the winter. There were chronic complaints of elk depredation on private lands in the vicinity, most of which the acquisition eliminated.

FLEECER MOUNTAIN

The Fleecer Mountain WMA, near Butte and Anaconda, has been a highly favored hunting area. For years, elk have journeyed high into the upper reaches of the Big Hole drainage to spend the summer, then back to the Fleecer vicinity for the winter. The area had a history of heavy domestic livestock grazing, leaving little for the elk to live on during the winter. In 1962, the department initiated purchase of lands that now form the Fleecer Mountain WMA. This range contains 6,432 acres of deeded land and an additional 877 acres leased from the Department of State Lands. It provides year-round habitat for elk, mule deer, moose, and a variety of other wildlife, as well as winter forage and cover for more than 1,000 elk.

BLACKTAIL

Acquisition of the Blacktail WMA was finalized in 1972. This purchase provided 11,261 acres of deeded land, with 6,161 acres leased from the Department of State Lands—a total of 17,422 acres managed to accommodate the needs of elk and other big game species. This extremely important parcel makes up the primary wintering ground for elk which migrate from summer ranges in the Snowcrest Mountains and upper Ruby River areas. This range is on the east fork of Blacktail Creek, approximately 30 miles southeast of Dillon.

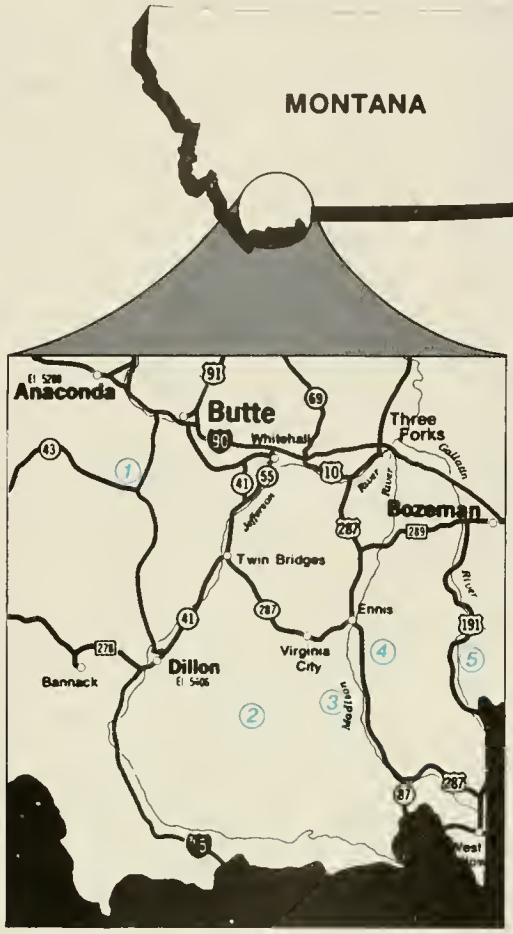
Before department ownership, the Blacktail was also home to 5,000 sheep and 800 domestic cows. Most livestock use was during summer, but the areas grazed were the same areas that elk needed during the winter, and the elk were compelled to forage on what vegetation was left. The current winter population of 900 elk on the wildlife management area is approximately twice the number present at the time the acquisition was made.

The major objective of these purchases was to provide a winter area for elk where competition for forage, space, and solitude could be eliminated by regulating or curtailing other uses of the land. As the condition and quantity of vegetation improved on these acquisitions, not only were better forage conditions offered for big game animals, but improved cover, nesting, and feeding areas for a variety of wildlife. Many additional benefits have accrued to the public. Because they are in public ownership, these lands now offer opportunities for hunting, fishing, photography, hiking, camping, and many other outdoor activities. Several miles of high quality fishing streams were secured along with the winter ranges.

These ranges are adjacent to national forest lands, which provide the bulk of the summer habitat for elk and other big game species. This allows movement between summer and winter ranges with minimal disturbance to adjacent private lands and also affords additional public access to areas that may have been closed to public use if they had remained in private ownership.

All activities and maintenance on these lands are designed to protect the landscape and to improve the quality and quantity of vegetation. A major activity is construction and maintenance of fences. Fences form all boundaries, which eliminates livestock

Five Elk Winter Ranges In Southwestern Montana



1. Fleecer Mountain WMA
2. Blacktail WMA
3. Wall Creek WMA
4. Bear Creek WMA
5. Gallatin WMA

grazing on the lands. The boundaries are also "signed" so the lands can easily be identified by the public.

Roads and trails are maintained in a primitive condition, minimizing impact on the landscape, yet allowing adequate public access with two-wheel drive vehicles. Maintenance of roads and trails is directed toward sites where soil erosion may begin or currently poses a problem. Culverts, cattle guards, and small bridges are installed as necessary to facilitate public travel. Off-road vehicles are not permitted on wildlife management areas. From Dec. 1 to May 15, all lands are closed to motorized vehicles to eliminate disturbance to wintering animals.

Since 1945, the department has acquired title to almost 27,000 acres of elk winter range in southwestern Montana. These ranges, purchased with sportsmen's dollars, support winter populations of approximately 3,600 elk. In addition, antelope, moose, mule and white-tailed deer, and a variety of birds and small mammals make seasonal or year-round use of the ranges. These lands were purchased for a total cost of $1,440,327—or $53.39 per acre.

In addition to initial costs, there are annual costs for operation. For fiscal year 1981, these included $9,378 in fees for the 11,157 acres leased, $9,196 for fees in lieu of taxes to the counties, and $53,703 for construction of fences and maintenance of existing facilities. For FY 1981, the total annual operating cost for these five winter ranges was $72,277. At present levels for wintering elk, this amounts to approximately $20 per elk. However, we have not yet seen the upper limit on the number of elk that can be maintained on these winter ranges, so the cost per elk will diminish as numbers of elk increase. If the values to the many other wildlife species were considered, the cost per elk would be even less.

The monetary value of an elk has been calculated in a variety of ways, resulting in a wide range of values from one locality to another. For example, the state of Colorado has assigned a value of $5,600 to an elk. Recent studies in our state have suggested that $2,000 is a more realistic figure for Montana. The latter is based on the market value of the recreation associated with elk hunting ($50 per day) in relation to the total recreation days provided per elk harvested.

Since these winter ranges support approximately 3,600 elk and 20% of these animals can be harvested annually, this amounts to 720 elk available to the hunting public each year. If the value of $2,000 is applied to the 720 elk, it amounts to $1,440,000 generated annually into Montana's economy. These figures strongly indicate that the current price of the resident elk license is a bargain by anybody's analysis.

The pressures on Montana's land base have increased greatly since purchase of the Gallatin Game Range in 1945. Livestock and big game still conflict for forage and space in many spots in southwestern Montana; however, many other interests also compete with wildlife. Expanding human populations and related demands now encroach into areas once not considered for human habitation. Subdivision of land for homes, particularly in the foothill zones, is constantly taking its toll on big game winter ranges. Man's demands for energy, minerals, and lumber continue to increase and intensify. The ultimate result is a reduction in the quantity and quality of habitat—habitat essential to wildlife in carrying out normal life processes.

"current and constant demands on the land magnify the value of the winter ranges purchased to date."

These current and constant demands on the land magnify the value of the winter ranges purchased to date. The Montana public and the wildlife species that use these areas have received—and will continue to receive—dividends. The dividends include not only a permanent range for wildlife but also a place that can be used and enjoyed by the public for years to come. A look into the years ahead tells us these ranges will become even more important to future generations. ■

Game Check Stations:

DFWP photo: Tom Warren

A Wildlife Management Tool

by Graham Taylor and Mike Frisina

Each fall, thousands of hunters assist the Montana Department of Fish, Wildlife and Parks in managing big game populations and fall hunting opportunity by stopping at game checking stations. Hunter cooperation enables department personnel to collect animal harvest data and other information crucial to making wildlife management decisions.

Other functions of game check stations include assisting hunters by providing information, enforcing Montana's game laws, monitoring hunter distribution and density, and managing special late or controlled hunts. These activities became essential parts in the design of game management programs which provide for optimum game populations and a maximum level of hunting opportunity.

Enforcement

Hunters are required by law to stop at established check stations on their routes to and from hunting areas. This law enables the department to determine compliance with laws and regulations dealing with tagging, season types, and bag limits. Enforcement of these regulations is one function of game check stations. Common violations observed include improper tagging, the taking of game animals without a proper license, overlimits, and the lack of evidence of the animal's sex on the carcass. Concerned sportsmen also have the opportunity to report violations of game laws to department employees. Perhaps the greatest enforcement value a check station has is in preventing game violations by making the hunter aware of existing laws and regulations.

Hunter Assistance

Contact between department employees and hunters is routine business at check stations. The value of these check stations in dispensing information to hunters probably cannot be measured. During the 1981 hunting season, department employees talked to 93,679 sportsmen at check stations and in the field. Hunters received information about season structure and length, bag limits, game population levels, land ownership, and current hunting conditions. Conversely, the hunter provides the department with current game management information. The free exchange of ideas and factual information at check stations is invaluable to the department in keeping in touch with Montana's sportsmen.

Controlled Hunts

Close regulation of harvest rates and hunter distribution in particular areas of the state is sometimes necessary when trying to manage a specific animal population. Often, the department will prescribe that a certain number of game animals be taken through legal harvest (by a harvest quota or limiting the number of hunters afield). These controlled hunts are usually associated with elk management, and department objectives are often most efficiently handled through a game check station. Check stations operated during a controlled hunt meet specific needs of both the department and the hunter. Without such stations, several elk hunts during the general and late hunting seasons in Montana would either be impossible or would be greatly altered at considerable inconvenience to the hunter.

Examples of check stations operating on this basis are found at Augusta (associated with the Sun River elk herd) and near Bozeman (associated with the Gallatin elk herd).

Game Management

Check stations are operated on opening day and during the general big game hunting season at main access points, travel routes, and other locations where many hunters and harvested game animals can be checked. The intensity and location at which a particular check station is operated depends on the type of season in progress and the degree of hunter activity. Some stations are operated only on opening day, weekends, and/or holidays, while others are operated continuously, daily, or on a 24-hour basis for the entire hunting season.

Information collected from harvested game animals is vital to game managers for determining how well a particular animal population is doing under the current management strategy. For example, the ratio of yearling males to older males provides an indication of harvest rates for the entire male population. A variety of techniques which involve examining teeth (dentition) can be used to determine the age of individual animals and information about the population as a whole; this is especially important when female or antlerless animals are being harvested. Other techniques, some of which involve weighing animals, measuring antler growth, and examining body fat, can be used to determine the general health and condition of harvested animals. Results from these techniques relate the status and health of the population to its habitat. Information gathered from hunters about distribution of the harvest by drainage within a hunting district helps wildlife managers determine which segments of a game population are more heavily harvested. Check stations also serve as a source of biological samples necessary for specific scientific research.

Department personnel also collect information about the distribution and density of hunters within hunting districts or portions of districts. The ratio of resident to nonresident hunters or the number of hunters from outside the local area can be calculated from check station information. Hunters are often asked to fill out special survey questionnaires which help the department determine how the public perceives game management in Montana and how the agency can better meet the needs of its hunting public. This type of information has become increasingly important to the department in its attempt to maintain a maximum amount of hunting opportunity in the face of increasing hunter numbers and a continuous reduction in secure, high quality wildlife habitat.

The usefulness of the information collected is enhanced when it is evaluated in conjunction with the statewide telephone harvest survey, aerial and ground game population surveys, animal movement studies, habitat inventories, and other data collected by Montana's wildlife managers.

Check stations play a vital part in maintaining Montana's big game populations for the current and future hunting public. They provide an excellent example of the progress of wildlife conservation and management in Montana, through cooperation between sportsmen and the Montana Department of Fish, Wildlife and Parks. ■

Gregson and Mill Creek Check Stations

The Gregson and Mill Creek check stations are situated near Butte and Anaconda and were established to gather wildlife management information and monitor hunter use of the Mount Haggin Wildlife Management Area (WMA). Personnel at these facilities also survey deer and elk Hunting Districts 341, 319, and 332. The stations are operated annually on weekends and holidays throughout the general big game hunting season.

Since 1977, Department of Fish, Wildlife and Parks personnel have interviewed approximately 24,000 hunters at these two stations. Information collected is used for planning wildlife management programs for the Mount Haggin WMA and throughout the Big Hole River drainage.

Information collected was instrumental in refining Hunting District boundaries for deer, elk, and moose and has allowed the department to adopt a more intensive management program than would have been possible otherwise. Hunter information from these check stations was also used in designing and implementing a road management program for Hunting Districts 319 and 341 which improves habitat security for elk, a consideration important to people hunting in these districts.

By stopping at the Gregson and Mill Creek check stations, hunters are contributing to the department's wildlife management efforts in the Big Hole area.—*Mike Frisina*

Gallatin Check Station

Most game check stations provide a variety of services to Montana's sportsmen—and the Gallatin check station is no exception. Throughout the season, the station provides current information about hunting conditions, gathers critical biological data, and plays an important role in controlling distribution of hunters and of elk harvest during the annual Gallatin late elk hunt.

Situated about 20 miles southwest of Bozeman, this station samples many of the hunters who hunt the Gallatin Canyon, an area of over 900 square miles. Less regularly, hunters from districts outlying the Gallatin Canyon are interviewed. Depending on the need, this check station operates either during daylight hours seven days a week (the general hunting season) or on a 24-hour basis five days a week (the Gallatin late elk hunt).

Established in 1934, the game check station has operated every year since. When the Gallatin highway was just a two-lane gravel road, hunters were checked by department personnel working from vehicles parked by the road. Today, the check station is a large, portable house trailer. The station has an ample pull-out area to accommodate modern traffic patterns and vehicles. The station offers a display of hunting and topographic maps to assist the hunter, examples of data retrieval methods, copies of current laws and regulations, and a motor-driven scale with which to weigh animals.

Principal game species checked at the Gallatin station include elk, moose, and mule deer. Occasionally, bears, white-tailed deer, mountain goats, antelope, upland game birds, and even fish are also checked through.

Depending on hunting conditions and the day of the week, the station can be a busy place. Over the last 10 years, department personnel at this check point have examined an average of over 650 animals per year and interviewed an average of 3,700 sportsmen. Weekends and holidays are the busiest days.

Information from countless interviews and conversations with sportsmen at check stations has established the basis for current management strategies for big game in a sizable portion of southwestern Montana. Check stations such as the Gallatin have allowed professional wildlife managers the opportunity of combining the art of people management with the science of sound game management and blending it into sound resource use.—*Graham Taylor*

Readers Respond

Compliments for Lake Placid Attendant

This is going to be a tough job. I find it very easy to write to my congressman to complain about waste in Washington, or to the mayor to complain about traffic control, or even to the Montana Department of Fish, Wildlife and Parks to complain about the limitations placed on my favorite hunting spot. But to write a complimentary letter is really tough! It is easy to say, "I'll do it tomorrow."

The evening of Sept. 6, my daughter and I started out for a three-day fishing trip to Placid Lake. Since it was the last day of the Labor Day weekend, I expected to find the campground in disarray due to the large crowds camping there for the long weekend.

We were astounded. The campsite was clean and orderly. The rest rooms were immaculate. The whole camp was in perfect shape. I couldn't imagine how anyone could keep up with the work necessary to maintain such fine conditions.

Then I met the camp attendant, Anna Manning, and understood how it was done. She is the most energetic, obliging, friendly, cheerful person I have ever met.

I am one of those crazy fishermen who believes if you get up early in the morning, you can catch fish before they are completely awake. Well, *I* might have been awake before *some* of those fish, but Anna was up with her rake, broom, shovel, and wash buckets before both the fish and me.

Thank you Montana Department of Fish, Wildlife and Parks for supplying such a nice campground at Placid Lake, and thank you, Anna Manning, for maintaining it in such a perfect way.—*Arthur Croci; Missoula, Mont.*

Poor They Ain't

Hats off to the party who wrote the "Dollars and Sense" letter in the Sept./Oct. 1982 issue of your magazine. This is the way the majority of farmers and ranchers feel. What gets us is when a motor home or camper comes into the yard, with a boat or motorcycle strapped onto it, or trailing a 4X4 jeep. And these people are "so poor" they need lodging and an 80- to 100-pound deer because they "can't afford to buy beef."

Then if we don't give them permission to hunt they become furious and accuse the rancher of "keeping them for himself." Who are they trying to fool? Compare farm and ranch prices (what we have to buy and sell) with labor prices, etc. for the past 30 years and see who's getting the most per hour or day. I feel we are right if we regulate or charge for the privilege of hunting on private property.

We do love to meet new people—hunters included—and also enjoy hunting ourselves, but some of the laws should change.

Your bird section was fabulous!—*a long-time subscriber (name withheld by request)*

Not Too Technical

I'm very excited to be starting a subscription to your magazine. I really enjoy the subject matter, and its presentation in not overly technical terms. Often, these types of articles are written by such enthusiastic authors (understandably) that their terminology leaves the novice trailing behind and discouraged.

Also, I've read and heard so much about your Special Pictorial Issue (Nov./Dec. 1981) that I want to order two copies for myself.—*Donna Nauneker; Sheridan, Wyo.*

And then there were none.

The list of already extinct animals grows . . . the great auk, the Texas gray wolf, the Badlands bighorn, the sea mink, the passenger pigeon . . .

What happens if civilization continues to slowly choke out wildlife species by species?

Man cannot live on a planet unfit for animals.

Join an organization that's doing something about preserving our endangered species. Get involved. Write the National Wildlife Federation, Department 105, 1412 16th Street, NW. Washington, DC 20036.

It's not too late.

Reader Enjoys Jenkins' Cover

I greatly enjoyed the Sept./Oct. 1982 issue of *Montana Outdoors*, particularly the Ron Jenkins front cover painting of Huns, as we have many on the ranch.

I would like to know if you could put me in contact with him because I would like to get a print of that painting, if one is available. I would appreciate your help very much.—*Dennis, McCoy, McCoy Cattle Company; Dillon, Mont.*

• *You can contact Ron Jenkins at 2344 Cloverdale; Missoula, MT 59801 (406/251-4219).*—Ed.

Butte School Kids Write

I really like your books! I read them at school all the time. I am thinking of sending away for them. I think they are exciting, especially the outdoors articles. We like the parts about the outdoors such as the fisherman and hunting stories. The whole class really likes them. They read them all the time.—*John Johnson; Butte, Mont.*

* * * * *

I read your magazines at home. I really like the stories on wildlife. I love animals and I like how the Department of Wildlife helps to keep animals from becoming extinct. I see it is very dangerous in a way—climbing mountains and trying to save the bald eagles. And also it is very hard to get people to stop killing these animals. I think a fine isn't enough. I think they should be put in jail for a week, then maybe they will stop killing them. The seals are going to be extinct if they don't stop killing them when they are babies. Well thank you and good-bye.—*Kyla Weldon; Butte, Mont.*

Montana Outdoors Index

The major items published in *Montana Outdoors* in 1982 are indexed below. Extra copies of all 1982 issues are available at $1 each, plus 25 cents for postage. Some earlier back issues are available, at the same price.

To inquire about or order a specific back issue, write: Back Issues, *Montana Outdoors*, Department of Fish, Wildlife and Parks; Helena, MT 59620.

BOOKS REVIEWED

The Bounty of the Earth Cookbook, by Sylvia G. Bashline (Jan./Feb. 1982).

Butte's Heritage Cookbook, edited by Jean McGrath (May/June 1982).

Montana Fishing, by Dale Burk (July/August 1982).

Montana's Bob Marshall Wilderness, by Roland Cheek (Sept./Oct. 1982).

Upland Bird Hunting, by Joel M. Vance (Sept./Oct. 1982).

Hunting the Great Plains, by John Barsness (Sept./Oct. 1982).

Hunting America's Mule Deer, by Jim Zumbo (Sept./Oct. 1982).

Mule and Black-tailed Deer of North America, compiled and edited by Olof C. Wallmo (Nov./Dec. 1982).

The Labrador Retriever: The History . . . The People, by Richard A. Wolters (Nov./Dec. 1982).

Rodale's Encyclopedia of Indoor Gardening, edited by Anne M. Halpin (Nov./Dec. 1982).

DEPARTMENT

A Tribute to Joseph J. Klabunde (1917-1982)—The Catchall (March/-April 1982).

Questions and Answers about the Big Game Drawings—The Catchall (Tere Hassett and Jim Heck, May/June 1982).

Aasheim Named Conservation Education Chief—The Catchall (Sept./Oct. 1982).

FISH/FISHING/WATER

From Cream Cans to Tankers—Montana's fish hatchery system has grown into a complex of scientifically managed facilities (Jim Schreiber, Jan./Feb. 1982).

The Miles City Sturgeon Incident—A fiction feature, but with an underlying message important to the continuing freedom of the Yellowstone River (Ken Walcheck, March/April 1982).

1981 Fishing Records Summary—Two records were broken, and one species was added to the list (May/June 1982).

The Hatch—The salmon fly hatch is the trout angler's first celebration of summer and point of reference for the entire year (Jerry Wells, May/June 1982).

Two Kinds of News—Because fishermen disagree about the brook trout's contribution to the fisheries program, it's a "good news/bad news" situation (Bob Domrose, May/June 1982).

Cedar Creek Fish Ladder—For the first time in 12 years, Yellowstone cutthroat trout have returned to traditional spawning areas in Cedar Creek, The Catchall (Chris Cauble and Chris Clancy, May/June 1982).

Of Water, Weeds, and Man—Even though they are sometimes a nuisance, water weeds also provide food and cover for waterfowl and fish (Paul Garrett, July/August 1982).

Don't Risk the Water—Even water in pristine places can harbor a pesky parasite, *Giardia* (Christine Deveny, July/August 1982).

The Rock Creek Experiment—Fisheries management successes on Rock Creek have provided valuable insights that might apply in other areas (Don Peters, July/August 1982).

A Prize Worth the Effort—Montana's cutthroats proved to be worth the effort it took to get to them—all the way from South Carolina (Jon Wongrey, July/August 1982).

Flathead's Bluebacks—Kokanee are the "bread-and-butter" fish in the upper Flathead (Patrick Graham, July/August 1982).

GAME/HUNTING

New Study Shows Elk See Colors—An NRA-funded study in Montana proved that elk can distinguish fluorescent orange and other colors (Doug Scott, Jan./Feb. 1982).

Counting "Prairie Goats"—Censusing antelope from an airplane provides valuable information, The Catchall (Tom Butts, July/August 1982).

Muzzleloaders: A New Look at Old Firearms—Muzzleloading enthusiasts agree that hunting with primitive firearms can add a new dimension to precious hunting days (Jim Lotan, Sept./Oct. 1982).

Identification of Montana's Upland Game Birds—The state's upland species, as they are likely to be seen by hunters in the fall (compiled by Dave Books, paintings by Ron Jenkins, Sept./Oct. 1982).

Montana's Cosmopolitan Game Bird—The Hungarian partridge is deserving of the adjective "cosmopolitan," since Montana's smallest game bird is at home in all parts of the state (Dr. John P. Weigand, Sept./Oct. 1982).

To Make a Hunter—"Hunter education" should broaden into "outdoor education" so those who love the outdoors will have the opportunity to learn some things about living, and perhaps even about freedom (John Madson, Sept./Oct. 1982).

Elk Success Story: An Overview—Elk continue to be one of the most desirable and sought-after big game species Montana has to offer (Gene Allen, Nov./Dec. 1982).

Old Bugler—A fictionalized story about an old man, a boy, and a magnificent elk which lives where the rocks touch the sky (Tom Butts, Nov./Dec. 1982).

A Winter Home for Elk—Five wintering ranges for elk in southwestern Montana (Arnold Foss and Fred King, Nov./Dec. 1982).

Survival Basics—When the talk turns to hunting, "survival" is a word most hunters don't consider carefully enough (Bob Miller, Nov./Dec. 1982).

Game Check Stations: A Wildlife Management Tool—Hunter cooperation enables department personnel to gather valuable information for wildlife management purposes (Graham Taylor and Mike Frisina, Nov./Dec. 1982).

GENERAL

Out of the Closet and Onto the Slopes—The days of hiding the fact that you prefer cross-country to downhill skiing are over (Tom Ellerhoff, Jan./Feb. 1982).

Born with a Feather in His Mouth—No silver spoon for Bob Elgas of Big Timber, whose interest in birds began very early (Ken Walcheck, Jan./Feb. 1982).

A Trail Back Through Time—Pollen grains in the sediments beneath a body of water provide clues to its history (Lynn Brant, Jan./Feb. 1982).

Three "Montana" Periodicals—*Montana Outdoors*, *Montana Magazine*, and *Montana, the Magazine of Western History*, The Catchall (Jan./-Feb. 1982).

Mushrooms: Fare Fit for the Gods—Don't miss the opportunity to explore the forest in search of these

"gastronomical celebrities" (Irene Wreggelsworth, March/April 1982).

Peaks, Parks Draw UM Students—The University of Montana's Outdoor Resource Center enables students to learn more about Montana's wildlands and rivers (Cary Holmquist, March/-April 1982).

Grizzly Bear: The Animal, the Symbol, the Enigma—Perhaps the most striking characteristic of grizzly bear management is that almost everyone has an opinion (Mike Aderhold, May/-June 1982).

The "Magic" Cows—Rest-rotation grazing consists of dividing the range into pastures, with each pasture being systematically grazed by livestock and then rested (Joe Egan, May/June 1982).

Montana's Mysterious Cat—The mountain lion moves slowly, takes advantage of cover, makes practically no noise, and has infinite patience (Kerry Murphy and Bart O'Gara, May/-June 1982).

Mount Haggin: Living History—Although the natural resources of Mount Haggin have long been recognized, the area is also a storehouse for historical and archaeological treasures (Alan Newell and Dick Ellis, May/June 1982).

Energy and Recreation—What's in Store?—Determining the "most fuel conserving" recreational activities is difficult (Paul Pacini, May/June 1982).

Coming Home to Roost—One of the world's most important dinosaur sites is here in Montana, and the prehistoric story will someday unfold at the Museum of the Rockies in Bozeman (Jack Horner, July/August 1982).

The "Bloody Nuisance" That Bites—It is highly unlikely that anyone has avoided an encounter with the prolific mosquito (G. Wesley Burnett and Lisa Mathis Butler, July/August 1982).

With Pen and Plant in Hand—What Meriwether Lewis observed with a pen in one hand and a plant in the other is remarkable, even today (Ken Walcheck, July/August 1982).

Two Treasures of Treasure County—The roots of Norris Cole and Harold Miller run deep into the Yellowstone country (Ken Walcheck, Sept./-Oct. 1982).

Scourge from the Skies—The breath of acid rain has reached into portions of Montana, but information on distribution patterns and sources of pollution is nonexistent (Ken Walcheck, Sept./Oct. 1982).

Two Ranchers' Perspectives—"Dollars and Sense" by a concerned landowner, and "Food for Thought" by Bob Boyd (Sept./Oct. 1982).

Learning Wildlife in Public Schools—Project WILD is a unique environmental and conservation education program emphasizing wildlife, The Catchall (Cliff Hamilton, Nov./Dec. 1982).

On the Way to the Blind, Dekes—poems by Paul Zarzyski, paintings by John Michael Marion (Nov./Dec. 1982).

HABITAT/ENVIRONMENT

Elkhorn Mountains Dedicated to Wildlife—The Catchall (Rich DeSimone, Jan./Feb. 1982).

Preserving a Piece of the West—The Flathead River Basin Environmental Impact Study is now into its fourth year (Gene Taylor, March/April 1982).

Mount Haggin: Management Plans—The Mount Haggin area provides important year-round habitat for elk, deer, moose, and a variety of other wild animals (Mike Frisina, May/June 1982).

Pheasants for the Future—After two years, a habitat restoration program in the Bitterroot Valley of western Montana has resulted in improvement in pheasant populations (Bill Thomas, Sept./Oct. 1982).

The Forest Road Issue—If forest roads continue to be constructed at present rates, big game hunting, fishing, and other forms of mountain recreation as we know them today will not be possible (Mike Aderhold, Nov./-Dec. 1982).

NONGAME WILDLIFE/
ENDANGERED SPECIES

A Falcon of Superlatives—A colorful, speedy falcon, the American kestrel is also the state's smallest (Vince Yannone, Jan./Feb. 1982).

A Giant Step Toward Success—Because of a peregrine recovery program, prospects for the falcon's future are bright (Dennis Flath, Jan./Feb. 1982).

Turkey Vultures: Nature's Sailplanes—Even though some descriptions by humans malign vultures, they are among nature's most eloquent expressions of flight (Ken Walcheck, March/April 1982).

McDonald Creek's Bald Eagles: An International Resource—McDonald Creek has become the site of the largest concentration of bald eagles south of Alaska (Riley McClelland, Nov./Dec. 1982).

Beaked Fisherman—The belted kingfisher is adept at capturing fish—and its only "tackle" is its beak (Vince Yannone, Nov./Dec. 1982).

PARKS

Wild Horse Island: A Natural Experience—This enchanting island in northwestern Montana offers the visitor an opportunity to experience harmony with nature (Barbara Brown Lathrop, March/April 1982).

Wild Horse Island: Where the Horse and Mule Roam Free—A 27-year-old black Arabian stallion and a 36-year-old brown mule have roamed free on the island for more than a quarter of a century (Jane and Don MacCarter, March/April 1982).

Wild Horse Island Loses its Mule—Readers Respond (May/June 1982).

Wild Horse Gets Three—Three wild horses were transported to the island in early October, The Catchall (Nov./-Dec. 1982).

Book Reviews

THE LABRADOR RETRIEVER: THE HISTORY. . .THE PEOPLE, by Richard A. Wolters, Petersen Prints, 6725 Sunset Boulevard, Los Angeles, CA 90028; 1981, 200 pages, illustrated, $37.50, hard cover.

The Labrador retriever is the most popular hunting dog in the world today. If you've ever owned one, you know why. They're smart, they're powerful swimmers, they have good noses, and most of them have gentle dispositions. But also they have some undefinable quality—some subtle combination of brains, charm, and looks—that sets them apart from other breeds. Maybe it has something to do with where they came from, and the people who nurtured them along the way. That is precisely what Richard Wolters' book provides us: A look at the Lab's history, and a glimpse of the people who devoted untold amounts of energy and money to the development of the breed.

It all began in a cold, inhospitable place in the Atlantic called Newfoundland. Popular theory has it that the Labrador was an offshoot of the larger Newfoundland dog—but Wolters argues, quite convincingly, that it was more likely the other way around. The Newfoundland breed as we know it today was more likely an offshoot of the Lab's forerunner, the St. John's dog. And how did the St. John's dog get to Newfoundland in the first place? I won't go into the details, but it's a fas-

cinating story of English sailors and fishermen, and it dates back to the 18th century. Between the breed's early origins in Newfoundland and its acceptance in America in the early 20th century, the Lab's fate lay largely in the hands of a few dedicated noblemen in England. At one point, the breed nearly died out. But today, the Lab is the most popular retriever on both sides of the Atlantic, and its future is secure.

With the mystery of the Lab's ancestry at least partially unraveled, Wolters goes on to describe the early field trials in this country, how they have changed over the years, how they differ from trials still held in England, and how training theories have changed with the changing circumstances. His interviews with old-timers in the retriever game, such as Paul Bakewell, John Olin, and Cotton Pershall, are fascinating. You'll get to meet some of the great field trial dogs—like Shed of Arden, King Buck, and Super Chief—through pictures and the words of those who knew them and saw them in action. You'll learn, for example, how King Buck, the subject of the 1959 federal duck stamp, was bought for $50 as a pup, nearly died of distemper, and went on to become one of the greatest field trial champions of all time.

The book carries a heavy price tag, but the color illustrations alone—reproductions of paintings by about 30 of America's finest outdoor artists—are worth the price. Some people might say it's a lot of money to pay for a book about dogs—but the Labrador is a lot of dog.—*Dave Books*

RODALE'S ENCYCLOPEDIA OF INDOOR GARDENING, edited by Anne M. Halpin, Rodale Press, Inc., Organic Park, Emmaus, PA 18049; 1980, 896 pages, $24.95 hardcover.

"Rodale's Encyclopedia of Indoor Gardening" is a *very* complete plant book. It covers every aspect of growing and caring for ornamental and edible plants indoors. With more than 560 beautiful full-color photos and 200 illustrations, this book is sure to keep you thinking green year-round, even on the greyest winter days.

The book tells readers how to have beautiful, healthy plants without introducing toxic chemical sprays into the household environment. Simple, safe pest and disease control methods like soap and water washing, alcohol spot applications, and hand picking are stressed; botanical insecticides such as tobacco solutions and rotenone are suggested only in extremes. Commercial synthetic pesticide preparations are never recommended.

The encyclopedia also shows how using indoor space extends the range of home gardening activities by stretching the growing season. This means that the house or greenhouse can be used to increase family food production, as well as provide the opportunity to live with foliage and flowering plants all year long. There are separate chapters on growing herbs and other edibles, as well as specific information on how to use an indoor light garden to start seeds for long-season garden crops.

Also included is information on ways to save energy, cut greenhouse fuel bills, and grow plants in cooler, energy-efficient environments. There are chapters on special kinds of plants, such as bromeliads, gesneriads, orchids, carnivorous plants, cacti and other succulents, and how to grow them. A section on environments explores options for locations in which to grow the plants—solar and traditional greenhouses, light gardens, window gardens, terrariums, skylights, and atriums. Another chapter discusses using plants in the home—how they fill a space, how they can work in a room and complement furniture.

An extensive encyclopedia section provides specifics on how to care for 250 individual plants and includes a color photo of each for ready identification. An appendix section lists plant societies and institutions to contact for further information.

Throughout, "Rodale's Encyclopedia of Indoor Gardening" contains, in addition to the main text, a variety of feature material—guidelines for buying plants by mail, recommendations on the most reliable bonsai plants for beginners, and more. Readers will also find many special projects to make or do, like building a "cold box" for window garden plants, constructing a plastic-enclosed flat for propagating seeds and delicate cuttings, and how to make their own lightweight benches, bench supports, and mist chamber for the greenhouse.

This comprehensive and authoritative volume has been prepared by a team of expert writers and consultants in the fields of botany and horticulture, and the editors of Rodale Press, publishers of *Organic Gardening.*

MULE AND BLACK-TAILED DEER OF NORTH AMERICA, compiled and edited by Olof C. Wallmo, a Wildlife Management Institute book, distributed by University of Nebraska Press, 901 N. 17th St., Lincoln, NE 68588; 1981, 629 pages, $29.95 hard cover.

Mule and black-tailed deer are the predominant deer of western North America; together with white-tailed deer, they constitute North America's premier big game species. For centuries, these wary native ungulates have challenged the hunter, enthralled the casual observer, and intrigued the naturalist.

Because mule and black-tailed deer are of such great aesthetic interest and recreational, economic, and ecological value to the public, management of them is essential. And this management must also accommodate other resource needs and values in the public interest. It is an occasionally complex, sometimes frustrating, always fascinating arena in which science and art must be blended skillfully to account for the whims and pervasiveness of mankind and the vagaries of nature.

Twenty-five years ago, the Wildlife Management Institute published "The Deer of North America," edited by Walter P. Taylor, "a consolidation of . . . information . . . [on] deer management as it is understood today [1956]." Since then, much of what is known of the ecology of mule and black-tailed deer *(Odocoileus hemionus)* has been revised and updated. A wealth of new information has been assembled, and management techniques have been greatly refined. This book was prepared to provide a new, definitive base for understanding and managing mule and black-tailed deer populations and their habitats, bringing together the most pertinent research findings, management experiences, and insights about these interesting and valuable animals.

Contributors to this volume represent many specialties within the wildlife management profession. They discuss topics ranging from the history of management to deer physiology, behavior, and interactions with various habitats and with other species, including man. This synthesis of current knowledge on mule and black-tailed deer provides the basis for recommendations that help shape the development of management practices.

In addition to serving as a timely reference for wildlife administrators, managers, researchers, educators, and students, the book is intended to encourage greater public understanding of the species—its populations, habits, and habitats—and greater appreciation for the need and role of scientific management.

Its 629 pages include 252 black-and-white illustrations and 54 maps.

The Forest Road Issue

photo: Steve Wirt

Although forest road closures are sometimes resisted by those accustomed to using them, they may be necessary to protect wildlife and to maintain big game hunting opportunities at their present level.

by Mike Aderhold

Every year for the past 20 years, over 800 miles of forest roads have been built in Montana. If forest roads are constructed at this rate during the next 20 years, big game hunting, fishing, and other forms of mountain recreation as we know them today simply will not be possible.

Before taking a closer look at this subject, it is important to understand three key points:

(1) The forest roads problem is rooted in competing resource values and land uses that, over the last 30 years, have grown much faster than anyone anticipated. The proliferation of roads is the result of various entities working independently to provide access for resource and land development. The current situation was not consciously created, nor is any one group solely responsible. Resolving the problem, however, will require action and cooperation from every quarter.

(2) A number of active debates are in progress concerning the management of forest lands. Some have been going for more than half a century and involve such issues as old growth forest management, forest regeneration, deficit timber sales, salvage logging, forest appraisals, contract incentives, harvest techniques, etc. Because all forest issues are related to some degree, it is easy to start discussing one, involve several others, and become hopelessly bogged down. The road issue can and should be separated from some of these other management issues. There is no argument with the need to extract resource commodities from or beneath forest land in ways consistent with the multiple-

use concept; the issue centers on the physical impact of permanent roads after these commodities have been extracted.

(3) The discussion of forest roads is not new. In the late 1940s and early 1950s, the Montana Fish and Game Department encouraged public land managers to construct more public access so that hunters could increase the deer and elk harvest to reduce overbrowsing on winter ranges and cut severe winter game losses. By the late 1960s, access and mobility of big game hunters had increased tremendously. In 1968, the Montana Fish and Game Commission formally requested that the U.S. Forest Service (USFS) restrict its road-building program where these roads would make key elk habitat, including calving grounds and winter and summer ranges, too accessible. Early in 1970, former Fish and Game Director Frank Dunkle corresponded on the subject with former Regional Forester Neal Rahm, and the issue has been discussed, debated, and negotiated with public and private land managers ever since.

There is nothing intrinsically bad about forest roads. They make it possible to efficiently and effectively remove valuable commercial products like timber, firewood, and various minerals from the woods. Roads facilitate fire control and forest management. They also make it easier for countless thousands to get to the backcountry to hunt, fish, gather mushrooms and berries, take photographs, and generally enjoy the solitude, sights, sounds, and smells of our natural forest bounty.

But forest roads also create some serious problems. For every mile of road, at least four acres are taken out of production. Roads disturb soils and vegetation, and thus affect water quality, siltation rates, stream flow, and soil moisture, indirectly affecting fish production. They make more of the forest vulnerable to littering, vandalism, man-caused fires, poaching, rustling, human crowding, and the theft of timber and other valued public and privately owned resources. Roads can also make sensitive wildlife areas more accessible and detract from the character of unique natural sites.

How many miles of forest road are enough? The answer, of course, varies—depending on one's point of view. But there must be a point at which the liabilities outweigh the benefits. From a wildlife and recreation perspective, we are approaching that point in some places.

How many miles of forest roads do we have in Montana now? No one knows for sure. The USFS has data for the 17.7% of Montana's land area it administers; although the figures are subject to some variation (depending on how roads are defined), there are roughly 30,000 miles of roads on the 16.7 million acres of national forest in Montana. More than half of this system has been developed since 1965.

Thirty thousand miles on what amounts to less than a fifth of the state is quite a road system. It is five times the entire primary road system managed by the Montana Department of Highways, and more than 50 times the length of the state! One-half mile on either side of 30,000 miles of road gives access to 19.2 million acres of land, or an area six times as large as Yellowstone and Glacier National parks combined. In fact, on the national forest road system in Montana, a recreationist is within one-half mile of an area almost twice as large as all the national parks in the continental United States.

How many miles of forest road exist on lands other than national forest in Montana? Although we can't say with as much certainty, we could easily add another 10,000 miles. Most of these roads are also open to the public. From a recreationist's point of view, we probably have more than enough forest roads right now.

To resolve conflicts in national forest management, in the mid-1970s Congress enacted the Resources Planning Act and the National Forest Management Act. These statutes required each national forest to develop a forest-wide management plan and assess its impacts. It is in the gathering and publication of information for these plans that the road issue has

Guidelines From the Road Management Policy

Approved by the Montana Fish and Game Commission, Oct. 13, 1982

To be used by the department in making recommendations to various land management agencies

1. To provide for an opening week bull elk harvest of less than 40% of the total season bull elk harvest, the department recommends implementation of a road management program from Oct. 15 through Nov. 30 that will maintain road densities with the following limits:

Existing %* Hiding Cover	Open Road Density Range
80	0.0 — 2.4 mi/mi²
70	0.0 — 1.9 mi/mi²
60	0.0 — 1.2 mi/mi²
50	0.0 — 0.1 mi/mi²

*Hiding cover is defined as any timber stand with 40% or more crown canopy coverage. Although a good relationship between harvest rate, road density, and hiding cover was found using this definition, it does not preclude refinement if or when better data are available.

The determination of the existing hiding cover-open road density relationship is recommended to be made in analysis areas such as a timber sale boundary area or timber compartment. As an example, in an area of 10 square miles, with an existing 70% hiding cover, 19 miles of open road would be allowed.

2. Calving grounds and nursery areas having concentrated elk use should be closed to motorized public use during periods of peak use by elk. Calving usually occurs in late May through mid-June and high mountain meadows are used as nursery areas in late June and July. These should be identified with land managers.
3. All winter range areas should be closed to motorized public use between Dec. 1 and May 15. Exceptions may be established through consultation with land managers.
4. A uniform signing program is desirable and the department recommends the following information be included:
   a. Type of restriction
   b. Reason for restriction
   c. Time period of restriction
   d. Cooperating land managers
5. New roads that eventually will be closed should be signed during construction indicating the effective date and reason for closure.
6. The Commission acknowledges that enforcement is a shared responsibility with land managers. Enforcement needs will be reviewed with land managers.
7. In situations where the needs of other species cannot be provided by these guidelines, evaluation must involve case-by-case analysis.
8. It is recognized that administrative uses of closed roads may be needed. Consideration of these needs should take place on a case-by-case basis with regard to protecting hunter opportunity and wildlife as identified under items 1-3.

taken on startling proportions.

In western Montana, three national forests—the Kootenai, the Lolo, and the Flathead—account for more than 70% of the timber harvest on national forest land in Montana. The road situation on these three forests is roughly as follows: The 2.25-million-acre Kootenai National Forest has 5,200 miles of road at present, and the management plan calls for a total of 10,400 miles. About 3,550 miles of the current road system are "local" roads, spurs that generally dead-end after running short distances; the plan calls for an increase in these roads to an eventual total of 8,570 miles. The 2.06-million-acre Lolo National Forest has 4,285 miles of road now, and the management plan calls for a total of 8,700 miles. The Lolo has 884 miles of local roads—about 20% of the planned 4,400-mile local system. The 2.03-million-acre Flathead National Forest presently has 3,146 miles of road, and the management plan calls for 6,027 to 6,757 miles at full development.

The roughly 9-million-acre area of Montana in which these national forests lie already produces two-thirds of Montana's hydroelectric power (with plans for more), and annually provides more than 200,000 days of stream fishing, 300,000 days of lake fishing, 350,000 days of big game hunting, and 75,000 days of bird hunting. The area may not be able to continue to accommodate all this use and the planned development too.

In the area of wildlife recreation, nothing makes this point better than our experience with elk populations and elk hunting.

Until the 1960s, management success and large blocks of undisturbed elk habitat allowed liberal elk seasons and relatively nonrestrictive hunting regulations. Between 1960 and 1970, however, extensive roading resulted in a significant increase in access. This, combined with a growing number of hunters, necessitated a return to more restrictive seasons to protect the elk from overharvest.

The primary factor in these trends is the dramatic increase in public road access. Since 1960 there has been about a 500% increase in forest roads. Every year, more hunters can get more places, leaving the animals with fewer secure areas—less escape cover where the animals have an edge on the hunters. Hunting success, once a function of skill and luck, has become in some cases a function of time and the ability to buy gas and drive the roads. A whole generation of hunters has grown up with this road-hunting option and has come to believe that additional access will continue to provide fresh opportunity. Many are losing touch with the essence of recreational hunting which has always been fair chase, the natural experience, personal challenge, and the luck of the outing. Some new hunters, unfortunately, have never experienced off-road hunting. The increment of this change has been so gradual that many do not recognize the impacts on the sport, the animals, or the land.

The net effect is more restrictive hunting regulations, fewer mature bulls in the elk population, less hunting freedom and opportunity, and an adversely affected recreation industry.

A Cooperative Elk-Logging Study begun in 1970 was the basis for a number of road closures and access restrictions on public lands between 1970 and 1980. Unfortunately, for every mile of forest road closed, two more were being constructed and 20 more were being planned. During the winter of 1981-82, it became obvious that despite good intentions the road issue was getting out of hand. In all of the western half of Montana, only the Department of Fish, Wildlife and Park's 7-million-acre Region 1 and the fabled Sun River country still had a general either-sex season, and in both areas, the either-sex hunt was reduced to eight days or a cow quota. In 1980, road closures had been fought in Seeley Lake by snowmobilers, in the Bitterroot Valley by firewood gatherers, and in the letters-to-the-editor sections of a number of newspapers by individuals who simply believed roads built with public funds should remain open to public use.

This past winter the hurdles to better road management seemed innumerable. Still, at professional wildlife conferences, and in informal meetings with district rangers, timber industry representatives, truck drivers, mill owners, loggers, forest technicians, and sportsmen, the issue kept coming up for discussion. In one-on-one conversations with those most familiar with the construction, impacts, and use of forest roads, most people were agreeing that some new thinking was needed. National forests could not continue to build up to 200 miles of road per year and still offer the multiple-use opportunities they are mandated to provide.

Faced with the responsibility of providing wildlife-oriented recreation now and in the future, the Department of Fish, Wildlife and Parks decided in February 1982 to develop a statewide road management policy. A committee was formed of department biologists most familiar with roads and logging

"How many miles of forest road are enough? The answer, of course, varies—depending on one's point of view. But there must be a point at which the liabilities outweigh the benefits. From a wildlife and recreation perspective, we are approaching that point in some places."

and their effects on wildlife. The committee drafted a 14-page policy, complete with restrictions, closure dates, and construction criteria. The draft included summaries of the elk-logging research; a three-dimensional graph relating cover, road density, and elk harvest; literature listing, and some recommendations dealing with timber management. A lot of work went into the draft. It was ambitious, comprehensive, technical, and . . . confusing. It was sent out on May 28, 1982, to a number of sportsmen's groups and timber organizations. It didn't fly. Many who read it just focused on parts of the policy, discounting or not understanding the whole issue. Many timber industry people read into it an attempt by the department to control timber harvest and forest management. So much adverse comment was received that the department redrafted the policy into a simple three-page statement of the problem, with a list of objectives and some suggested guidelines. Department wildlife biologists were asked to meet with industry and USFS officials to explain the issue. Industry officials said if they could get the timber needed, they were open to a discussion of road management and would consider closure of roads on their lands to benefit wildlife and recreation.

On Aug. 5, 1982, the Fish and Game Commission *tentatively* adopted this new policy and sent it out for review. The Commission met again on Oct. 13 to take final action on the new road management policy. The policy was approved, with only minor revisions and additions (see inset for the final draft).

The policy is a reasoned and responsible beginning. Much remains to be done to better explain this issue to Montanans. The policy at this point deals mainly with elk and the hunting seasons; there remains the greater responsibility of working more with private and public land managers to maintain the overall productivity of Montana's forests for future generations. The wildlife-oriented recreation industry involves thousands of jobs and provides a year-round boost to many local economies. This industry, which so strongly influences our quality of living in Montana, depends on the health and condition of the land. Over the last 40 years we have developed a road-building tradition that will be difficult to adjust. But it is time to think about two concepts that run counter to this tradition:

(1) **Every new "local" road should be closed, at least seasonally, after the timber or mineral has been removed, unless there is a clear public benefit in keeping it open.**

Current road policy is just the opposite, and is a major barrier to making progress on the problem. The public's desire for firewood also needs to be addressed and more steps could be taken to advertise its availability after timber harvest. The woods worker must be assured that the department is not opposed to construction of roads for timber extraction, but that wildlife cannot tolerate more roads in an already heavily roaded system. Road closures are sometimes resisted when they involve roads that the public is accustomed to using; closing roads built to extract commodities after those commodities have been removed eliminates this problem.

(2) **The net amount of roads on Montana's national forest and state forest land should be maintained at the 1983 level.**

For every new mile of local road built and left open, a mile should be closed somewhere else on the forest. But in planning road openings and closures, distribution of the roads must also be considered—i.e., closing roads in one portion of the forest may do little good if key elk areas are too heavily roaded in other portions. Basically, we can live with the amount of open forest roads we have now, but we cannot maintain existing recreational opportunities in the face of additions to the road system. Some people think the department is recommending a decrease in the current mileage of forest roads; that is not the case. The threat to forest recreation is more in the future than in the present but we need to halt the trend and gain control of the problem now.

Wildlife is an important product of the forest. Wildlife habitat maintenance is, has been, and will remain the primary element of sound wildlife conservation. Forest management is the art and science of manipulating the forest environment to produce the mix of products desired by the owners. These products change with time, economic conditions, public demand, legislation, and the capability of the land. The road issue is one of the things that has changed.

In the final analysis, the Department of Fish, Wildlife and Parks has very little control over the management of forest habitat. The department can appeal to land managers, explain its concerns to Montanans, and hope enough interest is aroused to effect a change. This is the object of this article. Let your public officials hear from you. ■

"Some people think the department is recommending a decrease in the current mileage of forest roads; that is not the case. The threat to forest recreation is more in the future than in the present, but we need to halt the trend and gain control of the problem now."

Dekes

Out over the blocks, the midday
colored lullaby of Indian summer—
color of harlequin duck, color of rainbow
trout—calls a halt to wing and wind,
to everything but the western marsh wren
flicking through the bullrush. Even
the waxy lily pad tongues melt limp
when time stands still in the blind.

Like a lone teal below treeline,
I drop out of nowhere
into these dekes I watched
my father carve, from cedar,
a thousand hunts ago—watched
him work without a word, chiseled
spitcurls spiraled like fern
fiddleheads at his feet, each
dustpanful of scraps and shavings
spattering a 4th of July fervor
from the hearth of the basement stove,
and the band saw squawking
that unmistakable squawk of sandhills
as it bit through heart. He etched
and sanded, whittled and rasped
till grain quilled into feather—mallard,
can, or scaup. He test-launched
in mom's sink—faucets turned full-gale
to gauge buoyancy—casted lead
and fastened it to the keels
for ballast. He stippled plumes,
pinstriped wing speculums,
pupiled-in each eye—gave them life
in pattern and pose, every habit
animate from a distance,
every motion but flight and dive.

Amid this dickybird afternoon, it's still
hard not to fathom all the havoc,
the deception these sculptures caused
in flock after flock—that crucial split
second of no return, wings and webs set
for the toll against wind and all odds,
fail-safe instinct proving flawed
the first time around. See how true
these stool ride water? They've lured
hunter—binoculars, logic, and all—
in for the stalk and swat. And once,
my father swears on his Winchester pump,
an angel of a snowy owl
stooped for easy prey, talons
knuckled deep in real "wood" duck
it lifted—anchor swaying
*like a plumb bob—*and *lifted*
—hunters stunned in disbelief—
and lifted *out of sight, the highest*
silent ovation—tribute and praise—
ever paid the maker.

—Paul Zarzyski

painting by John Michael Marion

On The Way To The Blind

This cow trail slits the frosted pasture,
thick skin of a rancher's hand
laid open by rope or cold. Every footstep
echoes from the throats of our waders, dry
thistle and milkweed tick, decoys
cluck together in their gunny sacks,
and a seam of light along the mountain-
rimmed horizon roves both ways,
like hairline cracks radiate
from a nick in eggshell or windshield.
This early, when coyotes sing
their highest notes, with everything
brittle as thin ice over the ditches,
the air ripens, ready to shatter,
any instant, to a million pintail wings.

—Paul Zarzyski

painting by John Michael Marion

Marion

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BEAKED FISHERMAN

by Vince Yannone
painting by Bob Story

"Beak agape, he swoops low over the clear stream and abruptly knifes in. He seizes his prey, a small, spiny sculpin which made the mistake of swimming too near the surface. Adroitly, the belted kingfisher *(Megaceryle alcyon)* noses up and breaks into the air, wings thrashing, heavy bill clamped on his gleaming prize.

"Now he flies up to a branch in a tall, dead tree. He stuns the fish by cracking its head against the bough, then flips it into the air and catches it head first. With a gulp, he polishes off breakfast and settles down to wait for his midmorning snack. He will sit quietly for a long time watching for the flicker of a fin above the stream bed." So the belted kingfisher is described in the National Geographic Society book, "Song and Garden Birds of North America."

Within its daily range, the kingfisher knows all the perches above a body of water from which a fish might possibly be spotted. It returns to these areas again and again in search of a piscine meal. It usually picks small fish because each makes an appropriate beakful. Occasionally, it may take a fish as long as it is. But the kingfisher swallows it anyhow; the tail sticks out from its bill only for a short while because of its fast-acting digestive juices.

Of 87 kingfisher species in the world, only six inhabit the Western Hemisphere. Of those six, the belted kingfisher is the most common type in North America, and it is the only one found north of Texas and Arizona.

Its large head with the ragged, bushy crest and its slaty-blue back are pretty hard to confuse with any other bird. The white belly is marked by a single grey band on the male and by both a grey band and a rusty-colored band on the female. The bird's habits of sitting motionless on a perch overhanging the water or diving into the water with a splash in search of a fishy morsel also distinguish it.

The kingfisher is found wherever the water is clear enough to reveal fish—by lakes, ponds, streams, seashores. It is possessive of its favorite fishing ground and will try to frighten intruders away with a penetrating, high-pitched clicking sound.

Although it prefers fish, it is not adverse to taking an occasional mouse, frog, tadpole, salamander, crayfish, grasshopper, or a wide range of aquatic insects. Like the sparrow hawk or kestrel, the kingfisher may temporarily hover over potential fishy prey. This helicopterlike flight helps it get a better look at the prey below. Then, tucking its wings close to its body, it drops with a resounding splash into the water. This technique is similar to that used by the osprey, but the osprey seizes its prey with horny, padded talons, while the kingfisher catches fish only with its beak. The kingfisher's feet are weak, with the toes joined—this helps in perching and nest construction, but not in catching prey.

Kingfishers nest in tunnels driven into steep banks of clay or sand, usually along streams, rivers, or lakes. Although sites near waterways are most often chosen, the bird may occasionally choose a nest site far from water, such as a railroad cut or even a cliff of dirt formed by a construction project. The tunnel is usually about four inches in diameter and may be up to 12 feet long. Both males and females dig the tunnels, using their heavy bills. Because the bills of males are often jagged, scratched, and show considerable wear, they probably do most of the excavation.

The female lays six or seven glossy white eggs which are then incubated by both sexes. After 17 to 23 days, the eggs hatch and the young emerge, blind and naked. Both males and females feed the young regurgitated food. By about two weeks, their pin feathers have grown. As they become older, larger, and stronger, they begin to consume larger pieces of food. After about four weeks they can fly, but they are still fed by the parents and remain in the family group. Finally, the adults cease feeding them, the young are forced to find their own food, and the family unit breaks up.

A unique characteristic of the kingfisher is the presence of red oil droplets in the cones of the retinas of the eyes. The kingfisher has three times as many of these droplets in its eyes as the average songbird. The droplets reduce the glare produced by scattered light, so this adaptation helps it spot fish when other birds would have trouble doing so. In addition, the kingfisher can see underwater.

They are not without enemies. Adult birds may be taken by birds of prey. Snakes sometimes crawl into their burrows and destroy both eggs and young. It was once thought the kingfisher slaughtered trout fry in many small streams, and many fishermen didn't think very kindly of this beaked competition. However, biologists now realize the kingfisher feeds largely on fish too small for the fisherman and therefore hardly poses a threat to the angler.

As the National Geographic Society book indicates, the kingfisher owes its scientific species name *alcyon* to classical mythology. Alcyone, daughter of Aeolus, grieved so deeply when her husband perished in a shipwreck that she threw herself into the sea. The pitying gods transformed both lovers into kingfishers who roamed the water side by side. When they nested on the open sea, the waves calmed and the weather remained clear and fine. We still call these "halcyon" days—and the next time you are spending one on a favorite trout stream, utter a small thanks to the beaked fisherman. ■

SURVIVAL B·A·S·I·C·S

by Bob Miller

WHEN the talk turns to hunting, "survival" is a word most recreationists don't consider carefully enough. Most hunters never expect to be lost. They never expect to slip on a log and break a leg. They never expect to become stranded overnight. They are convinced it can't happen to them.

But what *does* happen? Why do people become lost and wander aimlessly around, often within sight of their vehicles? Why have hunters' bodies been found with matches and food that were not used? Why have some lost hunters panicked, and then run until they dropped?

In the wild, Mother Nature is unforgiving of man's mistakes. When you enter the wild outdoors, you enter a habitat vastly different from the familiar, modern city. It is a place where man becomes just another animal that lives, breathes, moves, and tries to stay alive. Like the animals whose land he travels, man must be constantly alert for danger. He must be alert for subtle changes that indicate he could be in trouble. He must respect the weather and terrain because he cannot change or subdue them. He must plan ahead for all of his needs and accept the consequences of his mistakes.

Fortunately, man *can* acquire the knowledge and awareness to enjoy such places. He *can* provide the necessities. He *can* learn to understand and respect the land he travels. With mental and physical preparedness, he *can* cope with challenging situations.

How does one become prepared? To cover all aspects of survival would require far more than the limited space of this article. We can't answer everything, but we *can* cover basics — basics that could save your life.

Think first of the needs of your own body. That body must have water and food to supply energy. It must be maintained within narrow temperature limits. Since protecting the body is so important, let's look at clothing. Starting at the bottom, consider carefully your foot gear. Since you'll no doubt be doing quite a bit of walking, choose boots suitable for the type of terrain in which you'll be traveling. They should be waterproof and fit comfortably. Sore feet can ruin your enjoyment of an outing.

Since hunting is done in a variety of environments, you need the right combination of clothes to maintain body heat. Use the layer system. Consider the type of underwear which ventilates or "breathes." The second layer should provide comfort, utility, and durability —wool pants and wool shirts work well. Carry an outer waterproof and windproof garment should inclement weather occur unexpectedly. Covering your head is especially important

because a great deal of heat is lost when you are bareheaded.

Why is clothing so important? The biggest killer in the outdoors is hypothermia. Hypothermia is a condition similar to a fever—except in reverse. When your body temperature drops a few degrees, you begin suffering from hypothermia. It is caused by exposure to cold and is aggravated by wet, wind, and exhaustion. Hypothermia may be a new word to you, but it's the only word that describes the rapid, progressive mental and physical collapse accompanying the chilling of the inner core of the body. The early symptoms are uncontrolled shivering; memory lapses; numbness; vague, slow speech; fumbling hands, and frequent stumbling. Without treatment, stupor, collapse, and ultimately death can follow.

How can you prevent hypothermia? First, avoid exposure and stay dry. When clothes get wet, they lose their insulating value; for example, cotton and down lose about 90% of their insulating value if they become wet. Beware of wind; wind multiplies the problems of becoming chilled when you are wet. Second, if you cannot stay dry and warm under existing weather conditions using the clothes you have with you, head for shelter or home.

If you can't get back to camp or to your vehicle, concentrate on finding shelter and building a fire. Shelter is only clothing at a distance. A shelter may be constructed of lumber, bark, paper, cardboard, plastic, snow, or dirt and utilize insulation such as snow, dirt, paper, fabric, wood, cardboard, or air. Or, shelter can be as simple as a bushel-sized plastic garbage bag. Always carry one with you—with a hole cut in the sealed end for your face or head, it makes a quick, waterproof shelter. In emergencies, such as unexpected wind, rain or snowstorms where shelter is mandatory, do what the animals do—crawl under or burrow into foliage.

The better shelter you are able to construct, the less need for fire. Should you determine you definitely need fire for warmth or for psychological comfort, keep it small. Building and maintaining a fire can be important to your survival. It provides warmth, dries clothing, gives light, lifts your morale, is required for cooking, and give an excellent signal.

Everyone has heard about starting a fire with sticks, rubbing stones together, using flint, or the sun and a magnifying glass—but the most efficient way yet is with a match. Carry matches in a waterproof container. Also carry a candle; it saves matches and also makes starting the fire easier.

We have already mentioned a few items you should carry. Here are others:

- trail food—nuts, jerky, candy. Nibble often to maintain your energy.
- a pint container to carry liquid that can also be used to heat water. This container should fit in your pocket. With the top cut out, it can also double as a container for the rest of the items in your kit.
- garbage bag, 30-gallon size. Pull over legs and tuck into pockets to protect legs from wind and rain. Used in combination with the garbage bag mentioned earlier, your whole body can be sheltered.
- sugar cubes, wrapped in plastic. From six to 12 cubes will provide instant energy.
- tape—may be used to patch clothing, to secure the top and bottom of the plastic bags, as emergency bandage, etc.

The above items are minimum. Add the following for a more complete kit: single-edge razor blade, small whistle, small mirror, 24-inch small-gauge wire, nylon fish line, hooks, tea bags, bouillon cubes, and salt packets.

Before going hunting, *look ahead* to what you will need. Careful advance planning and an understanding of your own limitations are just as important as knowing what to do should you become lost.

1. Choose locations to complement your proficiency.
2. Always let someone know where you are going.
3. Avoid hazardous terrain.
4. Avoid unreasonable challenges.
5. Be prepared for the type of weather usual for the season, but also be prepared for the unexpected.
6. Choose companions with care. Try to match skill proficiencies as well as physical capabilities. Don't hunt alone.
7. Remember that strenuous exercise will require more energy and will create more stress on both mind and body.

In addition, add the word **S-T-O-P** to your hunting lingo. When you don't know exactly where you are or you have an emergency:

S—stop and sit down
T—think
O—observe
P—plan

In any emergency you can and must improvise from the materials available. To survive, you may have to make tools like a caveman, dig into the earth and live like an animal, and possibly forage for food. The greatest problem will be keeping alive a little longer. Remember, a person who thinks he can survive has a much better chance of doing so.

This article has not tried to supply all the answers. But it is a beginning and a reminder to think and plan ahead. Most survival situations can be avoided. And, all outdoor experiences can be more enjoyable with a little forethought. ■